EXTERMINATORS LOG

JUNE 1938 "Trade Paper Authority for Pest Control Industry" VOL. 6, NO. 6

ESTABLISHED 1933

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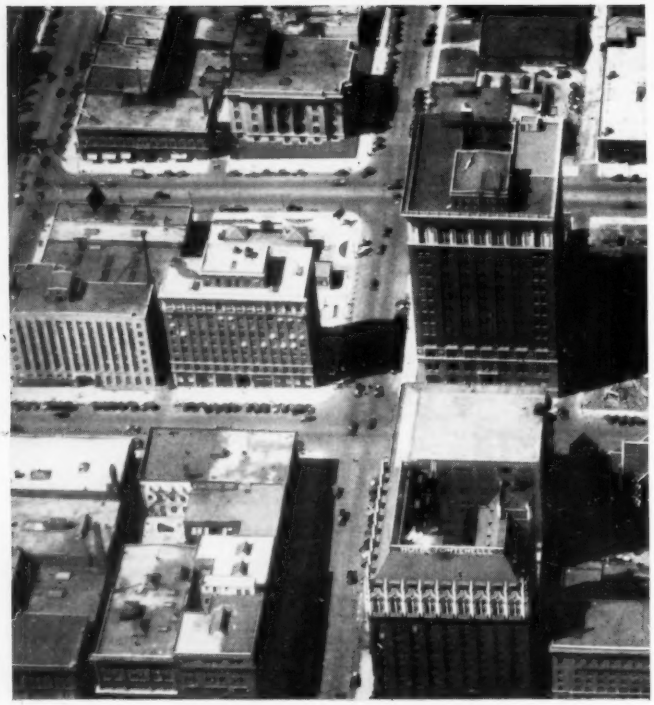
OMAHA

The 1938 Convention City



Downtown Omaha from the Air

Skyline View of Business Section of Omaha

Street Scene—Looking up Farnum Street

Stock Yards and Exchange Building, South Omaha

EXTERMINATORS LOG

TRADE PAPER FOR PEST CONTROL INDUSTRY

Exterminators, Fumigators, Termite Control Operators, Mothproofers, Entomologists, Manufacturers of Insecticides and Supplies.

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COOPERATING WITH
NATIONAL PEST CONTROL ASSOCIATION

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STATEMENT

The National Association appreciates the co-operation given by way of publicity. The Association is not responsible for articles published unless credited to the Association. The list of officers and directors is published for informational purposes only.

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3019 Fort Hamilton Parkway Brooklyn, New York

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"Contributed articles in this publication do not necessarily reflect the opinions of the editors. The editors invite discussions, comments and all types of literary material pertaining to pest control and pests from any person interested in the advancement of the field."

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Editorial

CHARLES RUTLAND GARDNER

Known to many pest control operators as just plain "Charlie," because of his willingness to give a helping hand always, it is with a deep sense of feeling and regret to tell of his death on May 14. As secretary of the Omaha Chamber of Commerce he gave of his valuable time in making plans for the Sixth Annual Convention of the National Pest Control Association. We extend our sincere sympathy to the family and Omaha. As a resident of Omaha more than thirty years, Charlie was as closely identified with and as much a part of the community's general activities as any person. Commissioner Frank Fogarty of the Omaha Chamber of Commerce has assured the pest control industry his personal co-operation for the coming convention in memory of the splendid work that had already been planned by Charlie.

Seeing Ourselves As Others See Us

THE following is a summary or report of an entomologist for which permission was obtained for publication. The name of the state and other identification remarks have been deleted purposely.

Termite prevention and control meetings were held in eight southern counties. Reports from County Agents, and personal observations indicate that in many county seat towns in this section, more than one-half of the dwellings are infested by these insects. This condition is due, not only to favorable climatic conditions, but also to the type of building structure prevalent throughout the hill country. Generally speaking, most of the homes are of old construction, and are placed on low stone foundation walls. Few have full basements and in the majority of cases, the areas beneath the buildings are entirely excavated. Such conditions are, of course, favorable to termite attack. In addition, many of the stone foundation walls have cracked, or have crumbling mortar, which has permitted termites to construct concealed shelter tubes within the interior of the walls. Many of the owners of these houses are fully conscious of their termite control problems, and are aware of the difficulties involved in the proper protection of their homes.

One of the most surprising facts that came to light during the week, is that there is an increasingly strong reaction against commercial termite control operators. Careful questioning of those making complaints, leads me to believe that this widespread adverse criticism has been brought about 100% by the unethical methods used by some of the concerns doing business in that part of the state.

In the first place, some of these men base their prices upon the ability of the customer to pay. Cases came to my attention where prices ranging from $25.00 to $250.00 were charged by the same termite control firm for almost identical jobs, requiring approximately the same amount of labor and material. In each case a 5-year guarantee was given on the work. What do these home owners think of the termite control operator when they get together and compare prices? Also what do they think of him when he promises faithfully to inspect the building every six months or every year, and then never shows up, even though the termites continue to work. Several cases of this kind came to my attention where appeal after appeal for a reinspection or a retreatment brought no response.

In the second place the home owners object to the high pressure salesmanship used. They are led to believe that immediate treatment is necessary to avoid severe damage, no matter how slight the infestation may be. In most instances, the treatment offered is represented to be the one effective treatment, whereas others are nearly worthless. It was amusing to learn of the number of methods said to have been approved by a certain university. At least one operator informed his prospects that he had taken a termite control course.

Another factor operating to the disadvantage of the termite control business is that those who make inspections of the infested buildings, apparently do not give accurate reports of the conditions of the structures, nor do they always recommend the proper treatments. I was called to inspect a church of stone, brick, and steel construction with a full basement having a concrete floor. Termites had entered through one crack in this floor, had worked their way up through a partition and were damaging the wooden structures above. In the vestibule the floor had been damaged a few years previous, but had been torn out and replaced with pressure treated wood. This damage apparently had been done by termites of a separate colony, whose only source of food had been cut off when the small area of flooring had been replaced. In regard to the present situation, it was immediately apparent that the remedy was a simple matter of reconstruction whereby the wooden partition would be removed and the floor crack filled with mortar. The partition might even be replaced with treated wood, or for that matter raised above the floor with an iron post or Lally column used to support the structure above. Regardless of the situation, a commercial firm had offered to treat the outside of the building for a substantial price. The church walls were of great depth and thickness offering nearly perfect protection against attacks from the insects from colonies outside the building. Even though the colony was located outside and the termites had undermined the foundation and basement floor, the advisability of an outside ground treatment would be questionable in view of the simple reconstruction necessary to remedy the trouble. The church board was also told that they would have to remove the vines, which covered the building, because termites would crawl up and enter through the windows. Apparently, the proposed ground treatment was toxic to plant life.

I was also asked to look at some houses with poured concrete foundation walls, full basements and filled porches. The filled porches, of course, were the sources of trouble and in each case, proper reconstruction, or use of soil poisons beneath these porches should effect control. Yet commercial treatments were offered at $100 and up, with various methods of treatments involved.

Another home owner came to me and said that he had installed a termite shield and had later found it to be ineffective. When I asked him why, he replied that a termite control man had informed him that the insects above the shield would continue to feed on the house and eventually destroy it. The termite operator, incidentally, offered a happy solution by stating that he could spray the wood above the shield and thus kill the insects. Many commercial firms, I have found, ridicule the use of metal shields and represent them to be worthless. Statements to this effect are without foundation of facts, unless such shields are improperly installed.

The situation, as I see it, and as it has been represented to me, indicates one thing: Commercial termite control operators in this part of the state are rapidly digging their own graves. Unfortunately, a general adverse reaction of public opinion works to the disadvantage of reliable firms as well as those responsible for the reaction. When will these men learn that the future of their termite control businesses depends entirely upon the good will of their customers and the public in general? No one can deny that there is a place for reliable termite control operators, but there is no place for racketeers. The good will of our people toward this work can be regained only through sound, ethical business dealings, on the part of all persons specializing in termite control.

AWAKENING

THE accomplishments and purposes of the National Pest Control Association have not been attempted without considerable pondering and much effort, and we believe they are steps in the right direction. Through service letters, by word of mouth, through the Log, and in various other ways the National Association is attempting to bring about a new and higher conception of the pest control profession; a broader, more comprehensive outlook, as well as a better realization of what is expected of us.

We do not live in an age of fairies and brownies, or in the land of make-believe wherein pest control operators are able to assume the role of Pied Pipers and make people believe that by some mysterious magic, rodents and pests can be made to disappear. But we do live in an age in which efficient service is not only demanded but must be given if we are to succeed as P. C. O.'s and the interests of the industry are to go forward. Even the National Seal expresses the purpose of moving onward. No longer the hocus pocus—"now you see them, soon you won't" attitude. No longer the attitude of mysterious secret formulas, the one and only of pest control christendom, the unlimited guarantees, etc., etc. Hoodwinking is being put to an end.

The public is rapidly reaching the place through education and publicity where it understands what true pest control service means. Of necessity we must improve our service, enlarge our understanding of pest control and through study better equip ourselves to fill the role expected of us. We are dealing with an informed public and the quicker we realize that unintelligent and unsatisfactory practices have no place in a successful P. C. O.'s activities, that much sooner will we gain the respect of the public and attain our rightful place as an industry.

Stop Sneering at Success

(Reprint from the Detroiter)

THROUGHOUT the world you observe nations ruled by emotion, not economics.

Some hypnotic personality or other has piped entire peoples into subservience—at about nine dollars per week per worker. Only soldiers get white bread.

Here we find a weird phenomenon. Our youth is taught to sneer at success.

Preachers and teachers inoculate their little bands of subjects with the virus of subversion. Down with capitalism! Down with profit-making! Down with success! Read the editorials in your offspring's school paper.

Hyphosis is in order. Horse-sense is passe.

You are supporting a business organization because you have been a success — comparatively. Your initiative, resourcefulness, enterprises—nothing else—have brought you some degree of independence.

Independence! Remember it?

What's to be done to bring independence back? Halt the conspiracy of hypnotic leaders, adolescent Congressmen, uninformed professors and pulpiteers, racketeering labor bleeders, tending to degrade our populace!

Our workers, if told the simple truth by someone, they might trust would not favor lowering themselves to the squalor of their European and Asiatic brethren.

Workers should see simple facts. Government is stifling and impoverishing them. Many have been taught to cultivate careers of permanent pauperism.

Let's turn about! Encourage initiative! Applaud success! Stimulate the spirit that made America! Save citizens of the world's richest nation from starvation. Show them the new frontiers revealed by scientists and threatened by political short-sightedness.

Protest—employer and employee—against Government oppression. Repeal abortive anti-business laws that are strangling our people and leading to dictatorship.

Congress can do it. Tell your Congressman.

Who Gets the Job?
or
Why Not Pay the Customer Rather Than the Customer Pay You

MAYBE in this day and age there should not be stories like this that are true, but we are reliably informed that this incident took place. Here it goes:

1—The Stage is Set: Two firms in business and blood relations but far from friendly attitude between them. We will call them Firm No. 1 and Firm No. 2 and the prospect is Mrs. Opportunist who is after "price" and will probably be happy to enter any plan that will make for the lowest possible figure. The conversation runs something like this when it is boiled down to mere essential facts.

FIRM No. 1—Places a bid for $19.00.

FIRM No. 2—Places a bid for $15.00, it being presumed that word was passed along that Firm No. 1 was in on the job.

FIRM No. 1—Was recalled by Mrs. Opportunist and informed of the lower rate by Firm No. 2 and because of feeling, it is hinted that Firm No. 2 being a relative and probably not-so-good, reduces the price to keep the job from going to Firm No. 2 and bids $13.00.

FIRM No. 2—Inquisitive to know what is happening about the job, calls on Mrs. Opportunist who is pleased to keep the feud going, makes for what is being called an excuse to offer a spite reduction and the price is then made $11.00 by firm No. 2.

Last heard — This is still going on and possibly there are thoughts that one should take the job at any amount so long as to keep it away from the other. No thought is being given about future jobs, because sooner or later there will be reminders that jobs were done for next to nothing. Just the old stubborn-mule attitude with neither ahead and all future work becomes not only a headache to the two firms, but there is also the ill will that grows among all firms.

SWELL PICTURE IN THESE ENLIGHTENING DAYS OF COSTS.

Sensible Rat Control Campaign

IF ANY money is to be spent for rat control Detroit wants to make sure that money is not wasted as is so often the case in famous W. P. A. rat campaigns of which Chicago rates as one of the biggest spendthrifts. Detroit, Mich. is to be congratulated in studying this problem and working at the source of the trouble and putting into effect laws that are already on the books. The alleys in certain sections of Detroit were found to be "rat breeders" and the natural question was to ask "why?" rather than merely asking for appropriation of money and spending it. Citizens of Detroit pointed out that why they prohibited their children from playing in alleys and vacant lots was because uncollected garbage, careless disposal of garbage, and faulty receptacles, attracted rats. Wrote one individual: "I know that there has been no pickup out here since before February 1st, because at that time I was sick and medicine bottles thrown away then are still in the alley. Just look at those rat holes under the garage. I have lived here nine years, but this is the first year we have ever been bothered with rats. We have plenty of them now. I burn my garbage but there is nothing you can do about tin cans." A further inspection of an alley in this same neighborhood disclosed that the alley was littered with tin cans, broken bottles and other rubbish.

Announcement was made through the Detroit, Mich. Times on March 26th that certain rules would be observed. We quote these rules:

1—Licensing of "mules" who pick up trash in Detroit alleys, rather than their carts. If a "mule" is caught scattering garbage in his search for saleable junk, his license will be revoked.

2—Department of Public Works will attempt weekly garbage collections during the summer.

3—Police Department's sanitary division will be increased 15 men during the summer and all precinct officers will be ordered to watch for violations of the garbage ordinance.

4—Department of Buildings and Safety Engineering will be asked to condemn all dilapidated buildings which now serve as rat holes.

These rules followed the survey under the direction of DPW Commissioner Henry E. Beyster, who made it clear that inadequate containers were largely responsible for the spreading of refuse and other rubbish. Offending householders were to receive a warning when such were found by the inspectors and if the local ordinance continued to be violated with regard to proper receptacles being provided, summons to appear in court would be issued. This campaign has the hearty endorsement and backing of F. Gardner Legg, secretary of the Board of Health, and Fred Clark, Chief Police Inspector.

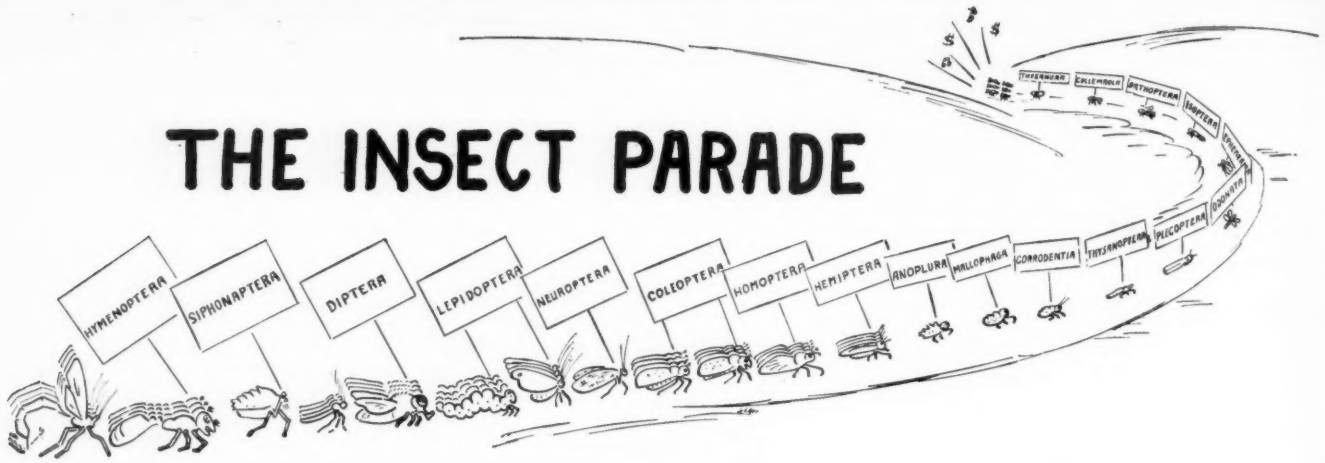
Detroit is to be complimented on this approach to the rat problem which not only gets at the source of the breeding but also saves needless spending of public funds. Every citizen should realize the importance of considering the health and welfare of others and should not tolerate the carelessness which permits breeding of rats.

Does Price Affect Services?

A MAN dignifies both his business and himself when he demonstrates his ability to enter a competitive field and obtain business without deviating from his established terms and prices.

The man with more than one price up his sleeve is soon branded as a trader whose judgment cannot be relied upon and whose every promise and claim must be taken with a very large grain of salt. Men are soon relegated to the ranks of failures when they become known as price cutters and concession makers. Substitutions, inferior quality and poor service logically follow. The buyer pays in the end if the sale is not predicated on cost plus a fair margin of profit.

—Indiana Real Estate Journal.



THE INSECT PARADE

Part XIII

(Continued from May issue)

By PROFESSOR HOWARD O. DEAY,
Department of Entomology, Purdue University, Lafayette, Ind.

Order Siphonaptera—The Fleas.

The members of this small order are well known because of the parasitic habits of the adults. These adults are extremely annoying to man and other mammals as well as to birds and cause considerable loss to them. Aside from the loss caused by their parasitic habits, fleas are of great importance as transmitters of certain diseases among which is the dread bubonic plague.

The members of this order are all small wingless insects, the largest species being but slightly over one-fourth of an inch long. Their bodies are strongly compressed laterally, that is flattened from right to left. The metamorphosis is complete. The mouthparts of the adults are fitted for piercing and sucking while those of the larvae are formed for chewing.

The integument of the adults is very tough and smooth and is furnished with numerous backward projecting spines which are arranged in rows. The slimness and smoothness of their bodies enables them to glide easily through the feathers or hairs of their hosts. The backward projecting spines undoubtedly prevent them from slipping backward and enables them to push steadily forward.

The legs of fleas are long and the hind ones are especially adapted for leaping. It has been recorded that a human flea can leap 13 inches forward and 8 inches high.

The eggs of fleas are pearly white and are just large enough to be plainly visible to the naked eye, being about 1/40 of an inch long. They may be deposited throughout the year if temperatures permit. They are commonly laid on the ground, in nests of birds, in cracks of floors, in the beds of pets, etc. They may also be laid among the hairs or feathers of the host, but they are not attached to them as are the eggs of lice and consequently fall to the ground or into the nest when the host moves about. The eggs hatch in a short time, usually from two to 12 days after they are laid.

Fig. 131—Larva and egg of the dog flea (Mich. A.E.S.)

The larvae (Fig. 131) are small, whitish and legless. They look much like maggots,

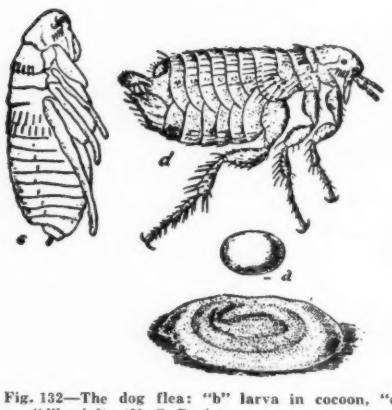


Fig. 132—The dog flea: "b" larva in cocoon, "c" pupa, "d" adult. (U. S. D. A.)

but have a distinct head and chewing mouthparts. They are not parasitic but feed upon various animal and vegetable matter in the soil and cracks in the floor, and upon animal excrement. The larvae shed their skins twice during their growth which requires from four days to several months. They then spin a silken cocoon (Fig. 132b) in which the pupal, or resting stage, is passed. They usually spend only about a week in the pupal stage, but they have been known to remain in this stage for over a year before transforming to adults.

The length of time it takes fleas to pass through the egg, larval and pupal stages varies from 17 days to over a year, depending on the temperature, moisture and food conditions.

The length of the adult life of fleas also varies in accordance with the species, the atmospheric conditions and the food supply. During hot dry weather when no animal host is present, they may live only a day or two. When allowed to feed on blood they may live from a month to a year. According to Bishopp the average life span of the adult human flea during the summer in the absence of food is about two months, and that of the dog flea is somewhat less.

There are about 500 species of fleas known to science at present, but many more species undoubtedly exist. The adults of all these species are blood suckers, feeding almost exclusively upon birds and mammals. One species has been collected on a snake in Australia, but as this same species has been collected from other animals, its presence on the snake may have been accidental. It is worthy of note that monkeys have no fleas. Those in zoological gardens may occasionally get a flea on them from the spectators who crowd around the cages, but monkeys in the wild never harbor fleas.

Unlike many parasitic insects fleas as a rule do not spend all of their time on the bodies of their hosts. The greater part of their time is probably spent on the ground, in the house, or in the nest of the animal whose blood they suck. Some fleas vary widely from this habit. Some, as the sticktight fleas, attach themselves permanently to the host, and others, as the chigoes actually burrow into the flesh.

Most species of fleas have some one host upon which they prefer to live, but they feed upon other kinds of animals and seem to thrive upon them. Thus man is the true host of the human flea; the cat family of the cat flea; and the dog family of the dog flea. But the human flea is found occasionally on cats and dogs; the cat and dog fleas are found on humans; and the cat fleas are found on dogs and dog fleas are found on cats. Different species of fleas vary widely in their range of host animals. Some seem to be very strictly confined to one species of animals, as the flea which attacks the longtailed field mouse. Most species seem to prefer to feed on a group of closely related species of hosts but some are commonly found on distantly related ones, as the sticktight, or the southern chicken flea, which also attacks dogs and cats in addition to poultry.

Fig. 133—The human flea (U. S. D. A.)

The cat flea, the dog flea (Fig. 132), the hen flea, the human flea (Fig. 133), the

(Continued on page 7)

rat flea and the sticktight flea (Fig. 134) are the principal species that annoy man and domestic animals in this country.

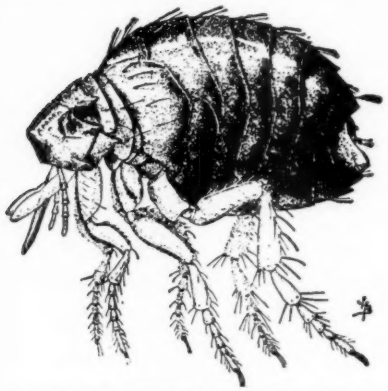


Fig. 134—The sticktight or southern chicken flea. (U. S. D. A.)

The cat and dog fleas and the human fleas are the principal household pests. In the eastern and southern parts of the United States the cat and dog fleas are the most abundant species. The human flea is the most abundant in the West and certain portions of the South but this species also occurs in the North. Hogs seem to be a favorite host of the human flea and they seem to be the chief source of infestations of this species, the larvae feeding in the soil in the pens.

Higher domestic animals are fairly free from flea attack. Hogs are sometimes attacked to a considerable extent by the human flea, but goats, cattle, sheep and horses are rarely annoyed except when barns become heavily infested with this species.

The sticktight or southern chicken flea (Fig. 134), is the most important of our live stock infesting fleas. It does serious damage to chickens in the Southern and Southwestern States. Young chickens when seriously infested die very quickly. These fleas attach themselves in clusters around the eyes, combs and wattles of chickens. The adult fleas remain throughout the greater part of their lives attached to the hosts which includes cats and dogs in addition to poultry.

There is another flea, the chigoe, which occurs in the West Indies, Mexico and the tropics but has not established itself in the United States, which causes serious injury to man by burrowing beneath the skin of the feet, causing the formation of sores which may become infested and cause the loss of a toe or a leg. The chigoe should not be confused with our common "chigger" or "jigger" which is a mite.

(Continued in June issue)

OMAHA, NEBRASKA
October 24-25-26, 1938

Sixth Annual Convention of National Pest Control Association

KEEN interest is being shown at this early date for the Sixth Annual Convention of the National Pest Control Association which will be held at Hotel Fontenelle, Omaha, Nebraska. Omaha has purposely been chosen for the 1938 convention in order to give many an opportunity to attend, who in the past because of distance, had found it impossible. Large contingents from the east are planning to travel by special cars and automobile caravans.

The convention will again feature outstanding speakers, booth exhibits, clinics that will take up both the study of various "Pests" and such problems as Legislation, Insurance, Advertising, and Methods.

Through the combination of the Annual Conventions and Educational Conferences such as were held at Purdue University and Leland Stanford University, the National Association is making it possible for pest control operators throughout the country to become more competent. The Annual Convention is open to all firms of the industry. A recent questionnaire as to the value of conventions and conferences might be summarized in part by a few of the answers which were given to the questions as to the specific value of attending such meetings:

"Enabled us to know the important problems of pest control."

"Contact with others in the field gave us many ideas."

"Realization of our relation to public health."

"Technical information is invaluable to me."

"Gave me confidence to continue along proper control methods."

"Fundamentals in entomology shown to be a necessity."

"Better idea of standardized methods."

"Aroused an interest in the study of my own business."

"An opportunity to compare notes with others."

"General knowledge and exchange of ideas."

"Fungus and Termite Destruction more clearly understood."

"Opportunity of becoming acquainted not only with my own competitors but with others throughout the country."

"Better knowledge of pest control poisons, life history of insects, their habits, and specific facts about certain pests I wanted to know more about."

"Realized I had plenty to learn and learned plenty I did not know before."

Such answers give a brief idea of what one gains by attendance. Several have already expressed themselves as wanting to know more about such subjects as: Termites, Moths, soil treatments, proper construction standards, general control measures, poisons, chemicals and dosages for various types of control, formulae and business methods.

The various committees are making final plans and among those in charge of different activities are:

National Officers

President: H. K. Steckel, 113 West Rich St., Columbus, Ohio.

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Chemistry and Modern Insecticides Used in Pest Control

By W. M. HOSKINS, *Division of Entomology and Parasitology*, University of California

EDITOR'S NOTE: *"The following address was delivered at the recent Pacific Pest Control Operator's Conference held at Leland Stanford University, Palo Alto, California. This splendid summary concisely shows the importance of research and how the pest control industry might well take heed to consider only such insecticides and chemicals which are the result of careful research work."*

THE development of entomology from a hobby cherished by a few nature lovers with a passion for collecting unusual examples of Nature's diverse living forms to a science and art which involve the services of thousands of expert workers and the expenditure of millions of dollars for the preservation of the food, health and possessions of mankind offers an extremely fine example of the evolution of science from the simple to the complex. The low esteem in which entomologists were held a century and a quarter ago is well illustrated by the following quotation from the English Entomologist Spence who writing in 1815 said:

"One principal reason for the little attention paid to entomology in this country has doubtless been the ridicule thrown upon the science. In the minds of most men, the learned as well as the vulgar, the idea of the trifling nature of his pursuit is so strongly associated with that of the diminutive size of its objects that an entomologist is synonymous with everything futile and childish."[1]

By way of contrast to this situation one may consider the Bureau of Entomology and Plant Quarantine of the United States Department of Agriculture with its hundreds of workers and multimillion dollar budget as well as the numerous state agriculture experiment stations with similar numerous personnel and heavy expenditures. It is more than a matter of money, however, for the professional entomologist is now an honored member of the scientific body. Dr. L. O. Howard, for many years chief of the Bureau of Entomology, was President of the American Association for the Advancement of Science in 1920, and Dr. Vernon Kellog, its permanent secretary for many years, was one of the best known American entomologists. Other examples might be mentioned in abundance.

It may be asked: What has brought about this change? Many answers may be given depending upon the point of view but the chief reasons probably are included in the following:

1. Changes of agriculture practice so that the same crop is grown over large areas have been favorable for the breeding of pests on these crops in huge numbers.
2. Crowding of people in cities favors increase in household insects and personal parasites.
3. Understanding of the role of many insects and other anthropods as disease carriers for man and animals has focused upon insects the attention of medical men and public health authorities.
4. Higher standards for foods have been instilled into the minds of purchasers so that wormy fruit or vegetables no longer are marketable, at least in this country.
5. General elevation of living standards no longer permits most persons to tolerate ants, cockroaches, fleas, lice and other agelong companions of careless and dirty mankind.

All such development as these have quickened interest in insects and have led to search for ways of abating the insect nuisance or menace. The question has been and still is: What can be done? It is necessary to do more than mention the chief methods which have been devised for this purpose: Change in horticultural practices such as rotation of crops and early or late planting; development of resistant varieties of plants; use of other insects as parasties or predators; changes in building methods in the case of those insects which attack lumber; use of traps; and above all, the use of chemicals to repel or poison the destructive species. In very many cases the last is the only worth while procedure, and it is always the one turned to when all others fail. The present science and practice of insect control by means of insecticides are extremely complicated and require the services of many specialists. The evolution from simple beginnings may be traced largely through crises that have arisen and remedies which have been developed in each case.

The earliest remedy of known composition probably was soap solution which was employed for aphis. Decoctions of various plants including tobacco also were used early in the nineteenth century without any knowledge of what the toxic ingredient might be. The first example of an overwhelming invasion and the development of a specific remedy was afforded by the Colorado potato beetle, *Leptinotarsa decemlineata*. Ordinarily a native of the high valleys of Colorado where it eked out a precarious existence upon certain weeds, this vigorous insect found potatoes entirely to its liking and promptly retraced the trail of the pioneers via the potato fields to the East. Soap solutions and similar washes were entirely useless against such a hard shelled creature. The story is told but without verification that the discovery of Paris green as an insecticide was made by a settler in the midwest who painted his window blinds with it and threw the rest upon his potato patch. Since Paris green was widely used in paints and since frantic efforts were made by thousands of farmers to find some way of killing the beetles, it is more likely that the discovery came as a result of a conscious experiment. By 1869 it was recommended by C. V. Riley[2] who at that time was the leading entomologist of this country.

In the late 1860's the vineyards of France were threatened by an invasion of the grape phylloxera, *Phylloxera vitifoliae*. A reward of 50,000 francs was offered by the government for an effective remedy but was not awarded although complaints were made by several persons who thought they had earned it. One tangible result was the proof that carbon bisulfide is an excellent soil insecticide. This material had been in use before for destruction of grain insects, and it still plays an important role as a fumigant for household, grain and soil pests.

The rapid spread of San Jose and other scales into the midwest and south in the 1870's presented another crisis which was met with considerable success by the invention of the petroleum oil emulsion, developed independently by A. J. Cook in Michigan[3] and Hubbard in Florida[4]. The oil used at first was kerosene and either soap or sour milk was recommended as the emulsifying agent. Since that time almost every imaginable variation in both oil and emulsifier has been tried, e. g. the oil has ranged from crude petroleum right out of the ground to a highly refined product suitable for medical use.

Another remedy for scale insects was first tried in California in 1886. The solution made by boiling together suspensions of lime and sulphur was first prepared by a gardener in France and became known as 'eau Grison.' It was used as a fungicide shortly after the middle of the last century and rendered invaluable service during the great sheep scab epidemic in Australia. The discovery that it was effective against San Jose scale led to widespread use with many kinds of scales which continues to this day.

The remarkable story of how Bordeaux mixture was developed by Millardet[5] as the result of chance observation of its use to prevent thieves from taking grapes from vines near a road is known to most entomologists. While it was Millardet's good luck to make the first observation and experiment, the subsequent improvements which have led to the widespread use of Bordeaux mixture were due largely to Gayon and other chemists in France, Germany and the United States.

Another outstanding development which occurred in California was the use of hydrogen cyanide for control of scales. The introduction of the cottony cushion scale, *Icerya purchasi*, from Australia in the late 1870's naturally attracted little or no attention at first but by 1883 its devastations in the citrus groves of Southern California were so serious that assistance was asked of the United States Department of Agriculture and of the University of California. Working independently, D. W. Coquillet[6] and F. W. Morse[7], both found hydrogen cyanide to be the only effective material from a host of substances tried. It is interesting that the insect for which it was developed, the cottony cushion scale, subsequently disappeared as a major problem due to biological control by the lady bird beetle, *Rodolia cardinalis*, popularly known as the Vedalia, but cyanide is at present the standard remedy for numerous other kinds of scales in all parts of the world.

The most widely used of all stomach insecticides, lead arsenate, was introduced in 1892. F. C. Moulton[8] who was a chemist employed by the committee appointed to devise ways and means for combatting the gypsy moth, *Porthetria dispar*, which starting from a few individuals accidentally liberated in Massachusetts about 1870, had in-

(Continued on Page 10)

Above: *Bar in the famous Bombay Room.*

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creased in numbers enormously and was threatening to destroy the shade and forest trees of the state. Unfortunately, the campaign was started too late and on too small a scale, so but little was accomplished. The moth is still a serious pest in New England and is slowly but steadily spreading.

As a final example of how an emergency caused by an insect has led to the development of a chemical suitable for control of the pest, attention may be drawn to the housefly and mosquitoes. The powdered flowers of the pyrethrum plant have been used for generations to lesson the annoying activities of fleas and the word "Buhach" was synonymous with "bugpowder" in a dozen or more languages. However, the production of standardized extracts which could be used as sprays did not start until after Dr. Howard, chief of the Bureau of Entomology, made the populace at large conscious of the fact that the common housefly is a potential carrier of typhoid fever and is a dirty individual in general. The part played by mosquitoes in the transmission of yellow fever and malaria caused them to be equally alarming. These conditions had always existed so there was no new emergency as in the examples previously cited, but recognition of the facts created the demand for a remedy and it was forthcoming. As a byproduct of this development the use of pyrethrum extracts has spread to the control of many insects which previously were handled in other ways or were not restrained at all.

These several examples have been mentioned to call attention to the fact that even in the first steps of developing a material for control of an insect pest, there must be close cooperation between the entomologist who finds the pest and determines at which part of its life history control measures are most likely to succeed and the chemist who suggests the most promising remedy and prepares it in suitable form for use. Such harmonious cooperation has not and does not always exist, for entomologists as a whole, even those in positions of authority, have been slow to realize their own helplessness in handling serious situations which do not yield to the ordinary measures. A lofty scorn for the smells and six-syllable words which frequently contaminate the atmosphere of a chemical laboratory is too often the characteristic reaction. On the other hand many chemists are so engrossed in theoretical considerations that they cannot unbend enough to listen to the woes of a "bug doctor." The attempts which have been made to hire a consulting chemist for periods of varying length are usually not very successful for such association often does not last long enough for the workers to learn to appreciate each other's problems and plans. It is clear that a special kind of organization embracing both biologists and chemists, and often engineers, is required. This is precisely what is being done by many manufacturers of insecticides and fungicides and the results already abundantly justify the necessary cost. If universities and other public research organizations are to uphold their obligations they also must become organized in a similar manner. In a sense it may be said that continued improvement in the control of insect pests calls for the intensive development of a whole new field of theoretical and applied sciences. That the need is real will be appreciated by anyone who familiarizes himself with the increasing difficulty encountered in controlling both old and new pests, the spreading of resistant varieties, the weakening of trees under long continued treatment and the rising concern over the use of organic substances containing arsenic, lead, fluorine and other poisonous elements. With one hand the regulatory authorities insist that fruit injured by insects or disease shall not be offered for sale and with the other they restrict the use of many of the most reliable remedies. On the horns of this dilemma the farmer is securely impaled.

Time is not available in which to discuss all the lines of work in which progress has been made, but a few examples may indicate some of the things which need to be done as well as a few accomplishments already brought to pass. It has been mentioned previously that many crude materials have been used from time to time without any knowledge of the toxic ingredients, let alone its concentration. Such materials can be standardized only biologically, i. e. by actual use. While this is better than no standardization at all. it leaves much to be desired, for biological tests are notorious for their slowness and uncertainty. The isolation of the toxic ingredients and establishment of methods for its quantitive estimation are particularly well illustrated by the plant products. Tobacco decoctions were used about two centuries ago and the alkaloid nicotine was isolated in 1828 although the formula was established beyond argument only in 1904. The use of either sprays or dusts standardized on the basis of nicotine content is of recent origin and has followed largely from the pioneer work of Dr. R. E. Smith[9] of the University of California who prepared nicotine dusts of known strength in 1918. The active ingredients of pyrethrum flowers were identified in 1910-16 by Staudinger and Ruzicka who after remarkable scientific restraint published their results in 1924[10]. The two pyrethrins first discovered as well as the new one found by La Forge and Haller[11] of the United States Department of Agriculture are esters of such complex nature that many reactions are available as possible means of analysis. At the same time their complex makeup offers opportunity for changes resulting in loss of toxicity upon exposure to the atmosphere and sunlight. The two problems of devising a chemical analysis which agrees with the biological effects and of prolonging the effectiveness after application have engrossed the attention of a large percentage of those who have worked with pyrethrum in recent years. The same statement may be made regarding the preparation from derris and cube. Here the situation is yet more complex for at least four different compounds occur which are of decidedly different toxicity and occur in varying ratios, although rotenone is usually the principal ingredient.

The proof that a large and complicated molecule exerts a physiological effect upon an organism at once raises the question of whether all or only part of the molecule is necessary. The concept of toxophoric groups which possess the fundamental property and are modified in their effects by inclusion in molecules of differing structure is a very alluring idea and has met with considerable success with numerous drugs used in medical practices, such as local anesthetics and hypnotic. In the case of insecticides two lines of work have been followed, (a) breakdown of known complex molecules in an effort to preserve the toxicity in a simpler and more stable unit and (b) synthesis of substances containing a structure known or thought to be toxic. So far the former has had poor success. Neither furan nor pyrrolidine which make up most of the nicotine molecule nor any of their simple derivatives have anywhere as great toxicity as nicotine itself. Similarly, neither the alcohol nor the acids which make up the pyrethrins have appreciable toxicity by themselves. Rotenone likewise has defied separation into a simpler toxic molecule, although the important observation has been made that addition of two atoms of hydrogen increases stability without decreasing toxicity.

At least a beginning has been made in the synthesis of compounds containing a toxic group. The thiocyanate radicle, SCN, is readily substituted for the hydroxyl group in alcohols. A study of the thiocyanates of the saturated even-carbon alcohols from ethyl to cetyl has been made[12], and it has been found that the toxicity is greatly affected by the length of the hydrocarbon chain. Maximum effect against aphids, thrips and red spiders is obtained with lauryl thiocyanatem $CH_3(CH_2)_{10}CH_2SCN$. Subsequent work[13] has shown that decreased danger to plants with no serious loss of insecticidal effect is obtained when oxygen is introduced into the hydrocarbon chain. Another interesting development is the combination of nicotine and the thiocyanate radicle in one molecule[14].

It has been found by numerous workers, e.g. Guy[15], that the presence of the elements carbon, nitrogen and sulphur in close proximity in a molecule gives rise to insecticidal effects. This is exemplified by the thiocyanates mentioned above, but other arrangements are possible such as in thiodiphenylamine, $C_6H_5\overset{S}{\underset{H}{N}}C_6H_5$. This substance is attracting wide interest as a substitute for lead arsenate in control of the codling moth.

There is little difficulty in understanding why a change in the structure of a molecule should result in altered toxicity but the effect of other kinds of changes is not always obvious. For example, it was found by Richardson and Smith[16], that nicotine in basic solution is much more toxic to mosquito larvae than when it is in acid solution. In the laboratory of the Division of Entomology at Berkeley it has been found that the toxicity of solutions of sodium arsenite[17], of sodium selenite and of sodium fluosilicate is affected by the pH of the solution, but it is greatest when the solution is acidic. The explanation for both results is that molecules are more easily taken in by the insect from the surrounding liquid than are ions. In a basic solution nicotine exists mostly as free nicotine molecules but in the presence of a little acid (much less is needed to injure the mosquito larvae) it is mostly in the form of ions. The other materials act just oppositely, i. e. they are in molecular form in acidic solutions. Observations such as these have stimulated interest in the conditions that insecticides encounter when they are swallowed by an insect. Studies on the pH of the digestive tracts of numerous insects have shown that wide extremes in acidity are not usually encountered. For instance, the strong acidity which is characteristic of the human stomach finds no counterpart among insects, though the absorptive region of the digestive tract is usually somewhat acidic, whereas the other regions are basic. It has been suggested that insecticides should be chosen for particular insects on the basis that conditions in the digestive tract should be most suitable for the absorption of the toxic substance chosen, but no practical use has been made of this idea as yet.

The problem of the most satisfactory method for application of an insecticide involves numerous complications. It is obvious that not only the quantity of material placed upon a surface but the uniformity of its distribution are of importance. It has long been the custom to use soaps, proteins or other accessory substances to increase the

wetting power of sprays, but only recently have detailed studies been made to determine how such substances affect the situation. A certain wetting power is very desirable but too much causes almost all of the spray to run off. Various experimenters have recommended the use of several different properties of a spray as the best measure of its performance in use, e. g., the surface tension, area covered by a given volume, rate of spread and angle of contact upon the solid which is sprayed. It was rather widely held at one time that lead arsenate for codling moth control should be placed upon the fruit in a spotty manner, but present sentiment is in favor of a very thin uniform coverage. Such differences can be brought about by proper choice of wetting agent. It was shown several years ago by Moore[18] that particles of lead arsenate in suspension carry an electrostatic charge, and it was suspected that this would affect the deposit. Recently[19] this was shown to be true, but it is obvious that much remains to be learned regarding this property of sprays. In the case of dusts the relation of charge to adherence is more readily investigated. The nature of the nozzle through which the dust passes has a very great effect upon how it behaves upon a leaf or fruit such as an orange. It may be predicted confidently that great practical advances will be made as the result of such studies.

The foregoing very sketchy discussion of certain problems which are now occupying the attention of those who are attempting to increase the success with which the unceasing onslaughts of the insect hordes can be forestalled will at once suggest how far this part of entomology has departed from that of other times. A new kind of training is required, based more on the physical sciences and less upon the biological than was the vogue a generation ago. When the foregoing matters are discussed with students seeking advice regarding the various lines of entomological work, a considerable number promptly decide to stick to the traditional fields such as taxonomy, morphology or biological control. It is a good thing that the huge and sprawling science of entomology attracts workers of varied interests for it is essential that it grow in all its branches. The motto must be: One for all and all for one.

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"Let not him who is houseless pull down the house of another, but let him work diligently, and build one for himself, thus by example assuring that his own shall be safe from violence when built."—Abraham Lincoln.

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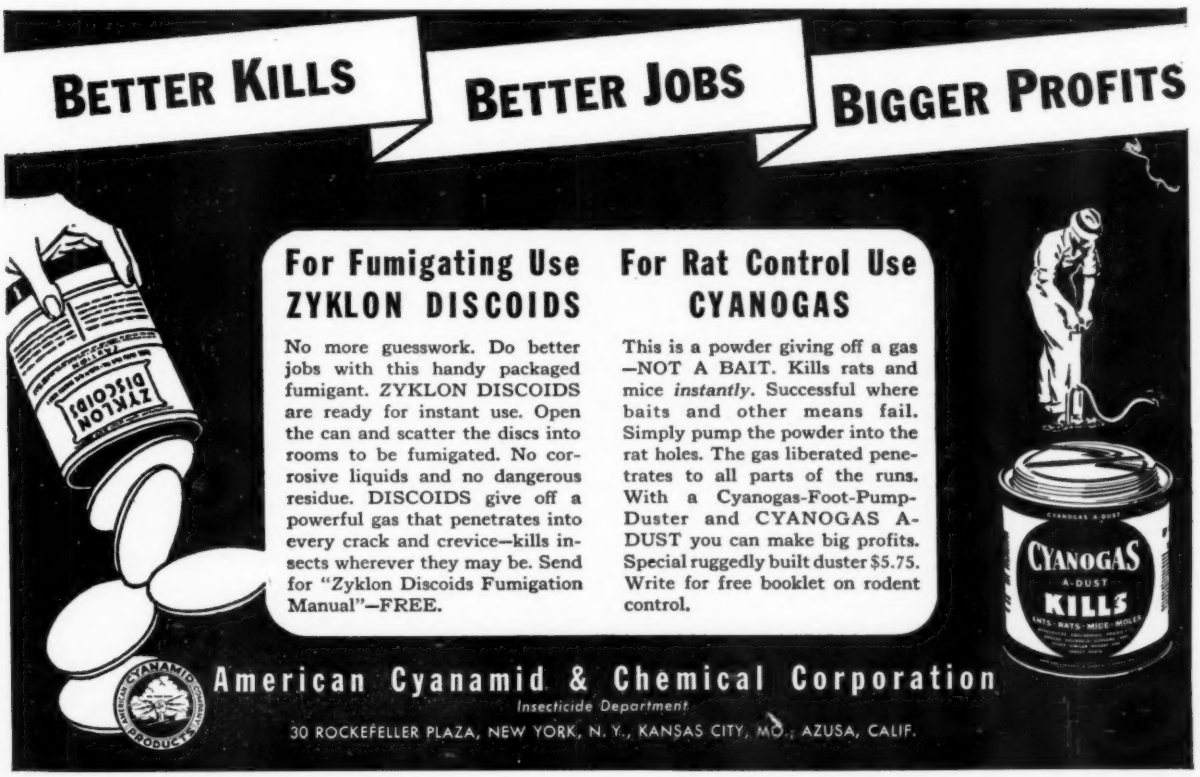
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MOTHPROOFING PROBLEMS

By PROF. W. C. McTAVISH,* *New York University*

THE many scientific papers which have appeared in recent years on the subject of mothproofing, as well as an existing list of well over a thousand patents on the subject, shows that intensive research on this problem has not been lacking. Yet it is probable that the economic loss due to moth infection still amounts to many millions of dollars annually. Part of this loss is undoubtedly due to carelessness on the part of the public and this large fraction of loss can only be partially remedied by extended educational campaigns such as is undertaken by government agencies or by intensive advertising by reliable commercial concerns. However, in spite of the many useful substances now available, it is necessary to admit that the ideal mothproofing compound has not yet made its appearance. The main purposes of this article are (1) to point out some of the more important desiderata which are still unattained, (2) to review briefly the present day situation in this field, and (3) to suggest a basis for future research.

An ideal mothproofing compound should be non-toxic to human beings, and one that can be applied easily to both the finished and unfinished goods most vulnerable to attack, such as wool, furs and feathers. It should be colorless, odorless and leave the treated material unaffected as far as its ordinary properties are concerned. It should not dust away or be removed by aqueous detergents or the fat solvents employed in dry cleaning, and finally it should not deteriorate with normal usage but be effective throughout the life of the treated material.

An examination of published information to find how closely the theoretically perfect substance has been approached reveals considerable confusion and contradiction, and much of this trouble arises from the inadequate technique and interpretation of accelerated tests made on test pieces with living larvae. Some of these experimental difficulties are described in a paper by Moore (J. Ind. Eng. Chem. (Anal. Ed.) vol. 2, p. 365 (1930). Two important points should be noted, first that the larvae can cause damage in two ways, by eating the fabric as they grow, secondly by cutting fibers to form pupal cocoons in their adult state. In the latter case it is obvious that no ordinary eating poison can save the infested material. The accelerated Petri dish test, using side by side samples of differently treated materials, can at best only reveal relative moth repellent action; there is no certainty that if one piece were present the larvae would not attack it eventually. There is also the question of the age and breed of the larvae themselves. If they are too young there will always be a great mortality; if too old they may no longer be eating and will tend to form cocoons. The question of artificial selection is not negligible; a well-known commercial testing laboratory has available a family of larvae many of whose ancestors have been killed by countless previous tests; the present descendants have a very noticeable tolerance for many of the commonly used poisons and will survive much rougher treatment than the average moth larvae. Such factors as these will have to be standardized to a greater extent if an adequate judgment is to be passed on the relative efficacies of many of the proposed mothproofing compounds.

Of the many hundreds of substances suggested for use in moth control, only a few have proven to be of a practical value. These can be divided into two classes; first, those which are essentially temporary in their action, and second, those which purport to be of a more lasting nature.

In the first or temporary class, the object is to kill moth life at all its stages either by means of a vapor or liquid, and when this is accomplished, the treated material is to be kept in tight containers where further contamination by moths is physically impossible. In the vapor class a considerable variety of substances have been suggested. The great contrast between the cedar lined closet and the use of hydrogen cyanide gas illustrates the wide range of effectiveness and practicability available. In actual practice a compromise is necessary in the majority of cases—in consequence the use of clean relatively harmless high vapor pressure solids is most convenient. Of these naphthalene and paradichlorobenzene are the most widely used. The failure of the manufacturers to teach the public the limitations of these substances has been deplored by previous writers; this lack of cooperation is particularly unfortunate since it is believed that with proper handling these safe and sane substances have considerable efficacy.

The use of liquids instead of vapors is more effective, although the work of applying the liquids is difficult. They are applied directly in the form of a copious spray or direct pouring to secure thorough inhibition by the fabric and direct contact with the moth life. (A useful liquid-vapor combination for inaccessible places is propylene dichloride and carbon tetrachloride as recommended by the Mich. Agr. Exp. Sta-1934.) Many liquids have been suggested, none seems more effective than ordinary gasoline; (diluted with carbon tetrachloride to reduce the fire hazards). Frequently, vegetable insecticides are dissolved in hydrocarbons—the favorites are pyrethum extract, cube and derris roots. These tend to prolong the larvicide action after the solvent has evaporated away. Unfortunately deterioration of these natural insecticides under ordinary atmospheric conditions is relatively rapid.

It is in the so-called permanently effective class that the greatest improvement can be expected. In contrast with the first group which purports to kill by contact and then evaporate away, the substances in this class are supposed to remain in the treated material and poison the larvae during feeding.

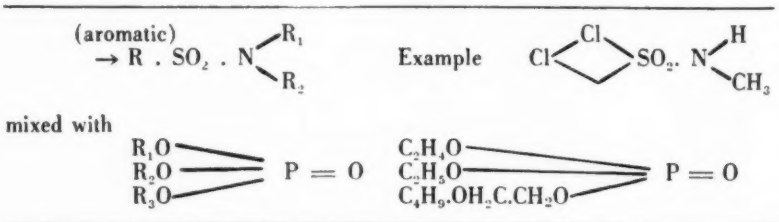
Dilute aqueous solutions of silico-fluorides, containing alum, are the only ones in this class which have been popularized for household use. The treated material has a flair moth repellent activity for a reasonable amount of time. The recommended practice is to renew the application annually. Like all water soluble substances they can be readily lost by accidental wetting or washing—moreover their use is necessarily restricted to materials which are not injured by water.

In contrast with these are the larvicides which are soluble in the usual dry cleaning solvents. The best known are the cinchona alkaloids used either alone or in combination with oleic acid. This class of moth repellents has not yet reached the household stage but is extensively used by the professional dry cleaners. The effects of the cinchona derivative under normal wear last about as long as in the case of the silico fluorides; as shown by Jackson and Wassell, J. Ind. Eng. Chem., vol. 19, pg. 1175 (1927) they are resistant to water but must be renewed after each drycleaning.

In Europe considerable use is made of colorless water soluble derivatives comparable to "Martius yellow." Although the history of this moth proofing dye goes back to ancient Egyptian times, it is still being improved by the modern chemist; "Eulan" is the best known derivative, recently (1934) "Eulan new" has been claimed as an improvement. This type of larvicide approaches the ideal case perhaps more nearly than any of the others mentioned. It seems to attach itself firmly to the fibres of the treated fabric and will resist mechanical working as well as washing in water or fat solvents. Unfortunately under ordinary atmospheric conditions of moisture and light it does not hold its effectiveness any longer than the others. These dye-like materials are best applied during the finishing process rather than later on and accordingly are not likely to find much household use.

Until very recently the chemical background of larvicidal compounds has been almost entirely empirical or accidental. The toxicity of pyrethum, hydrocyanic cyanide, carbon bisulphite, and the fluorides on insects in general have long been known. In searching for new and improved compounds it was necessary to work by analogy rather than any firmly based chemical knowledge.

A good example of this empiricism is given by a recent patent (U. S. 1,955,207) where some arylsulphonic acid amides have been shown to possess good moth proofing qualities but are insufficiently soluble in the fat-solvents for use in the dry-cleaning process—by mixing with organic phosphorus compounds free from sulphonic and carboxylic groups this defect is overcome.



In more general attempts to increase larvicidal toxicity, fastness to fibre adhesion and permanent stability, the knowledge of general characteristics has been the leading guide. For example, the cinchona alkaloids were used on the basis of the following known properties. They are: 1) salt-forming organic compounds, 2) bitter substances, 3) intestinal irritants, 4) germicides and

* Address before 24th annual meeting, Natl. Assn. of Insecticide & Disinfectant Mfrs., New York, Dec., 1937.

antiseptics, 5) astringents, 6) some of their derivatives are local anesthetics.

Perhaps the first serious attempt to generalize larvicidal properties in terms of a type chemical formula is found in the patents of Lommel and Munzel. Their formula is the following

$$-N(R)-X=Y$$

Where R is H or a radical, X is N or C, and Y is N, C or nuclear radical. Obviously such a type arrangement is very broad.

A number of substances which could be classed under this formula were tested by Minaeff and Wright (J. Ind. Eng. Chem. Vol. 21, pg. 1187 (1929)). These fell into two general categories, first, aniline and some of its dye-like derivatives, second, several benzene rings. The authors of this investigation found that aniline and a number of dyes were relatively useless. A number of colorless derivatives were useless for moth proofing purposes, or they damaged the surface of the treated fabrics.

On the other hand the urea derivatives gave some very interesting results. Compounds such as thiourea, phenylthiourea, allylthiourea, and tolylthiorea showed excellent moth-proofing qualities which appeared to be quite lasting, while other compounds very similar to these, such as allylurea, thiocarbanilide and diphenylthiourea gave negative results. Minaeff and Wright conclude that although Lommel's formula is not significant as far as urea derivatives are concerned, certain generalities can be observed; namely, that good mothproofing compounds of this group contain sulphur and at least one intact amide group.

It may pay in the long run to generalize the problem even further. The fundamental chemical characteristic of the clothes moth is its ability to digest the keratin of wool in much the same manner that higher organisms digest various protein components of the diet. In general, it has long been known that keratin is not readily digested by the enzymes of the digestive tract of most animal species. In consequence the digestive system of the clothes moth must be equipped with a unique enzyme or series of enzymes capable of hydrolyzing keratin. Such enzymes are conveniently designated as keratinases. It would appear that any rational attack upon the problem of mothproofing woolens should be directed towards a study of the fundamental properties of keratinases. Curiously this does not seem to have occupied the attention of such investigators as have concerned themselves with the problem of mothproofing.

Recently a series of interesting papers on the keratinase of the clothes moth feniola have appeared under the authorship of the noted biochemist K. Linderstrom-Lang and his pupil F. Duspiva (Zeit, physiol. Chem. 227, 131-158 (1935), 241 168 (1936) 241, 177-200 (1936)).

These investigators examined the nature of the proteolytic enzymes secreted by the intestinal cells of the clothes moth larvae. The intestinal secretions were found to contain an active proteinase capable of hydrolyzing casein but not wool keratin and keratinase which rapidly effects the hydrolysis of wool keratin.

At the same time it was found that the intestinal enzymes of the larvae of the closely related wax moth galleria resemble in most respects those of the clothes moth with respect to the hydrolysis of proteins other than wool. This of course is in agreement with the known fact that galleria larvae cannot utilize wool as a foodstuff.

Seeking to discover the cause of this difference in the digestive abilities of the two closely related species it was observed that the intestinal secretions of the clothes-moth bore a marked reducing power which is absent from the comparable secretions of galleria larvae. Experimentally this was demonstrated by feeding the larvae of both species bits of wool dyed with indigo disulfonic acid and coated with wax. The wax, of course, prevented any destructive hydrolysis of the wool as it passed through the intestinal tract. Subsequent examinations of the ingested wool fibers disclosed that in the intestine of the clothes-moth larvae the indigo was reduced to the colorless indigo white while no evidence of such reduction could be found in parallel experiments with wax moth larvae.

Further examination of the intestinal secretions of the clothesmoth larvae disclosed the presence of a thiol compound whose nature is as yet undetermined. Apparently this thiol compound is responsible for the high reducing intensity of the intestinal secretions and may be regarded as an important component of the keratin digesting mechanism. Confirmation of this view is to be found in an interesting experiment by Duspiva who utilized the intestinal secretions of galleria larvae—which under natural conditions cannot digest keratin and found that upon the addition of a thiol compound such as cysteine the enzymes present became capable of hydrolyzing wool keratin.

From this it would appear that among the insects the clothes-moth larvae is a

(Continued on Page 14)

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nuisance largely because of the intestinal secretion of a thiol compound which renders wool susceptible to attack by proteolytic enzymes.

A question naturally arises as to the mechanism of the action of such compounds in the gut of the larvae. In this connection it is of interest to recall the chemical structure of wool. This substance in common with other native proteins consists of long chains of amino acids linked together as polypeptides. Among the component amino acids is cystine which accounts for approximately 7 to 8 per cent of the wool protein. As a result the structure of wool contains besides the classical polypeptide linkages, present in all proteins, several disulphide linkages which are present in the cystine molecule. Now any disulphide linkage may be ruptured by a sufficiently powerful reducing agent thus

$$R\text{-}S\text{-}S\text{-}R + 2\,H \longrightarrow 2\,RSH$$

Wool is no exception to this rule and one may suppose that in the intestinal tract of the clothes-moth larvae the unknown thiol compound (USH) may function as just such a reducing agent reacting with the wool as follows:

$$R\text{-}S\text{-}S\text{-}R + 2USH \longrightarrow 2RSH + U\text{-}S\text{-}S\text{-}U$$

As a matter of fact this concept rests upon a firm experimental foundation since in another connection Michaelis and Goddard* have shown that wool may be easily brought into solution by treatment with an alkaline solution of thio glycollic acid which acts toward the wool in a fashion identical with the compound USH in the above equation. Furthermore Michaelis and Goddard observed that a wool solution so prepared upon acidification deposited a mixture of proteins quite different from wool. Important in the present connection is their observation that this reprecipitated wool is easily digested by the pancreatic proteolytic enzyme trypsin which is without action upon native wool.

These observations have important implications in connection with the problem of mothproofing for they indicate an obvious mode of attack. If the wool were treated with an agent which upon ingestion by larvae would oxidize the thiol compounds of the intestinal secretions before the former would reduce the wool, the larvae would starve to death or seek a more appetizing repast. The patent literature is replete with references to the use of thiourea derivatives as mothproofing agencies. The utility of such compounds was undoubtedly discovered empirically since the patent dates antedate the investigations mentioned above. Nevertheless their mode of action now appears easily understandable for thiourea derivatives are themselves capable of participating in oxidation reduction reactions and act presumably by oxidizing the thiol compounds of the intestinal secretions to the inactive disulphides thereby rendering keratin digestion impossible.

Don't add yesterday's load to what you must carry today. It makes the burden too heavy, and putting tomorrow's load on top of that makes one you cannot support.

Someone has said that knowledge is power and rightfully used can be converted into large bank accounts.—E. W. Owen.

Happiness, like mercy, is twice blessed; it blesses those who are most intimately associated in it, and it blesses all those who see it, hear it, feel it, touch it, or breathe the same atmosphere.—Kate Douglas Wiggin.

24th Annual Summer Meeting

of the

National Association of Insecticide and Disinfectant Manufacturers

THE 24th Annual Summer meeting of the National Association of Insecticide and Disinfectant Manufacturers Association will be held June 13th to 15th at the Spink-Wawasee, Indiana. The program will include several outstanding authorities in their respective fields. The guest speakers will discuss such subjects as marketing and merchandising of insecticides, disinfectants and sanitary products, their purchase and use by the public institutions, maintenance of sanitation of railroad cars, fly spray formulation, moth products and other subjects.

General sessions will continue for each of the mornings at 9:00 A. M. and afternoons will be given over for group and committee meetings. Various committees will make reports followed by discussions. New and pending state and federal legislation affecting the members of the Association will be discussed. The new revised Peet-Grady Test will be presented for discussion and adoption. The report on chemical methods in invaluating insecticides will be presented. W. J. Zick is chairman of the Program Committee.

The tentative list of guest speakers and their subjects follow:

Carl W. Dipman, Editor PROGRESSIVE GROCER, "Marketing and Trends in the Grocery Trade".

Prof. J. J. Davis, Chief in Entomology, Purdue University, Lafayette, Indiana,—"Future of Household Insecticides on the Farm".

Dr. R. C. Roark, In Charge, Insecticide Investigations, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.,—"Study of Various Formulas that Have Been Recommended for the Prepartion of Kerosene-Pyrethrum Type of Household Fly Spray".

F. R. Callahan, Superintendent of Yards, (in charge of all rolling stock) Pullman Company, Chicago, Ill.—"Sanitation on Pullman Cars from the Insecticide and Disinfectant Standpoint".

Prof. E. Searles, Entomologist, University of Wisconsin, Madison, Wisconsin—Cattle Spray Technique".

Dr. E. A. Back, Principal Entomologist, Insects Affecting Man and Animals, Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, Washington, D. C.—"Some Experiments in Testing Fabrics Treated with Mothproofing Solutions".

Department Representative State of Indiana on "Maintenance of Sanitation in Public Institutions".

W. N. Sullivan, Division of Control Investigations, U. S. Department of Agriculture, Washington, D. C.—"The Effects of Pyrethrins I and II on House Flies—A Method for Determining the Knockdown of Insecticides" by W. N. Sullivan, H. L. Haller, E. R. McGovran and G. L. Phillips, Bureau of Entomology and Plant Quarantine.

Dr. F. L. Campbell, Assistant Professor Entomology, Ohio State University, Columbus, Ohio—"NAIDM Fellowship Report on Test Methods Against Crawling Insects".

Dr. George W. Hoover (consultant), Washington, D. C.—"The Lea Bill and the Federal Trade Commission—New Food and Drugs Act".

Advertising That Counts

There has come to our attention a write-up which we feel worthy of passing along for the idea that it may have for pest control operators throughout the country. Many newspapers carry special sections for local firms and for the most part progressive merchants, manufacturers and other specialized fields have one inch advertisements. Included with such sections are write-ups. The following should prove helpful to others who might like to suggest suitable copy.

The following article appeared in the Worcester Evening Gazette under the column entitled "Succeed with Worcester."

P. C. O.'s New Name For Pest Exterminators

"Alphabets being the rage, a group of highly useful citizens now ask to be known as P. C. O.'s," says George R. Elliott of the Ransford Insecticide Co., 58 Front street. "Once they were Pied Pipers—after the storybook scoundrel. Later, rat and bug killers denoted those unsung worthies whose profession was the pursuit of pests. The derby hat era brought Exterminators, a title befitting a man-sized job. It has suited us quite well; but now we prefer to be P. C. O.'s—Pest Control Operators.

"Yes, we still kill rats and bugs; we will always exterminate vermin. But there is much more to the picture. Worcester County has some fourteen thousand to fifteen thousand insects which infest property; household, agricultural and stored food pests. Their control is serious business; Government and Education are in the fight, and heading the attack is the pest control industry."

So widely do insects differ, physically and in habits, that a corresponding range of materials, equipment and tactics is called into play. This field is the life study of the pest control operator. There is no "best" material nor method for controlling insects or rodents in general. "All-purpose" insecticides belie their name, while a method effective in one situation may be entirely unsuited to another. In pest problems the common-sense procedure is to consult a competent pest control operator.

During 40 years in Worcester the Ransford Insecticide Co. has built up an enviable reputation as a pioneer in the pest control industry. Its operations include exterminating, fumigating, mothproofing, termite control and the manufacture of quality insecticides. Inquiries are always welcome at the office, 59 Front street.

The telephone number is 4-4801.

Book Review

"WOOD PRESERVATION," by George M. Hunt and George A. Garrett; 457 pp. with 108 figures and 24 tables. McGraw-Hill, 1938. $5.00.

Editor's Note: The following review was written by Neely Turner, Entomologist, Connecticut Agricultural Experiment Station, New Haven, Conn. That there is considerable confusion to say nothing of misunderstanding on the part of termite control operators with regard to chemicals used for wood preservative purposes and chemicals used for soil treatments, is only putting it mildly. Added to this is the false conception entertained by termite control operators as to the value of certain chemicals when applied by mere spraying, painting, or even injection under pressure on timbers in place. Every termite control operator would be doing himself a favor to add this book to his library and use as a reference book.

The book is not written with a primary purpose of assisting termite control operators but any termite control operator who has not the fundamental grasp of all that is involved in the matter of wood preservation might better not engage in termite control work. The interesting feature of this book as far as the termite control operator is concerned is the background that is afforded in connection with chemicals used in wood preservation and what the research has thus far provided by way of facts of various chemicals widely advertised. The chapter mentioning certain proprietary products indicates that experience records are not quite as complete as they might be to allow for statements often made in connection with these chemicals.

As one visualized the tremendous investments that have been made for treating plants and other factors that enter into the art of providing what might be termed approved treated lumber, a greater realization is had that much of the over-emphasized treating by various methods of timber in place by termite control operators almost borders on the ridiculous.

The chapter on preservatives, as mentioned above, is particularly valuable to the termite control operator in that it discusses the requirements of good wood preservatives as well as to methods that will determine their effectiveness. Prof. Emanuel Fritz in commenting on this book in his review published in the "Yale Forest School News" said in part: "The description of the several oils and water soluble preservatives are rather specific and give advantages and disadvantages. In the case of the controversy over possible danger of arsenicals, the authors state their viewpoint but wisely take no definite stand. Nevertheless, from what they say, it is apparent that the possibility of danger is overrated. In the case of new and promising proprietary preservatives, the authors are brief and impartial, but call attention to the important fact, that, in some cases, service records do not yet cover a sufficiently long period to bear out the claims of the inventors or promoters." This would further substantiate the growing feeling that termite control operators have altogether too frequently accepted the literal statements of some of the manufacturers.

Two better authors could not have been found, said Prof. Fritz further, who qualify in the first place as one nationally known expert and researcher in wood preservation with thirty years of experience while the other is an able and critical teacher of the subject and a consultant familiar with practical problems.

This book can rightfully be called a text book that should be in the library of every termite control operator. Neely Turner has summarized the book very briefly in a manner that would encourage the termite control operator to read for himself.

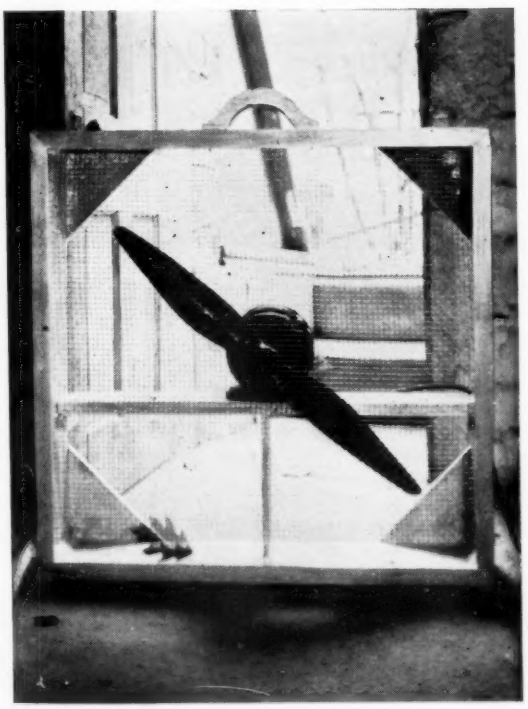
"This book is an exceptionally complete summary of wood preservation. The authors are well qualified by training and experience to discuss the subject, and they have succeeded admirably in producing a well-balanced, clear and concise summary of it.

The first chapter deals with the field of wood preservation, and includes a convincing statement as to the need for treated wood and the possibilities for expansion of its use. Two chapters are devoted to the agencies of wood deterioration, including fungi, termites, powder-post beetles, carpenter ants, marine borers, *Limuoria* and *Chelura*. Destruction by fire and mechanical wear are discussed briefly.

The section on wood preservation is very logically arranged. There is a very complete discussion of wood preservatives, preparation of wood for treatment, and the actual processses of treatment. Fortunately the authors have included the trade names of many proprietary preservatives and methods. It was impossible for them to pass judgment on many comparatively new preservatives, and they have adopted the commendable attitude of stating the facts rather than jumping at conclusions.

The chapter on "Factors Affecting Penetration and Absorption" contains an excel-

(Continued on Page 16)



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lent summary of wood anatomy. The relation of treating procedure and form and size of timber to absorption is also discussed.

The discussion of "Economic Aspects of Preservative Treatment" is a striking and convincing statement as to the savings resulting from use of properly treated wood. Most of the actual figures given are taken from records of the various railroad companies, because these concerns are the largest users of treated wood and have the most complete records. The results are nothing short of astounding, and indicate the immediate necessity of applying wood preservatives to wood used in other ways.

"Treating Plants and Equipment" are discussed, starting with the simplest brush and spray equipment and including all types from hot-and-cold-bath to the most elaborate large scale pressure-treating plants.

Methods of protecting wood other than by standard preservative treatment and fire-retarding treatments constitute the final chapters. The appendix includes standard specifications for treatment and methods for determining penetration.

The entire book is well documented with many references following each chapter. It is so full of facts that it is difficult to summarize in a short review. There are literally hundreds of statements of utmost interest to anyone interested in wood preservation. Termite control operators who impregnate timbers in place will find a great deal of practical information in this volume. Very little is said concerning this practice, but the facts given are in many cases applicable. The termite control problem is discussed in relation to the general problem of wood preservation. Every control operator should be interested in the discussion of rotting of wood and the preventive measures."

*The Hole Truth About Moths

THERE are some 6,000 species of moths in the United States, most of which I cannot name. But I have an unprintable description for the kind that ruined an expensive sweater I recently examined in my closet.

I never knew I had so much wild life right in my own den. The knowledge aroused my curiosity.

A moth under favorable conditions, I have learned, can reproduce 1,000 descendants in a single year. One mothworm destroys more than 3,500 times its weight before it is fully grown.

A mothworm does not operate under union rules; but if he works only an eight-hour day he can travel sixty-four feet in that time—more than seven times across the width of a 9x12 rug! This is faster, for his size, than the prairie dog burrows. And the mothworm eats as he travels.. Nice "work"—and mothworms get it.

All animal fibers, whether they be wool, mohair, bristles, hair or even leather, are subject to attack by moths. There are two species that cause household damage—the case-making moth and the webbing moth.

A moth starts life as a tiny white egg. This hatches into a tiny larva, wormlike in appearance. It is this larva which feeds on your wools and mohairs. After several weeks of eating, it spins a little cocoon: here it develops without additional eating. Thus folded up, it is known as the pupa and, when mature, breaks open its cocoon and becomes a flyer.

It is now ready to mate and deposit its quota of eggs. The flying moth does not eat and does no damage beyond laying eggs which develop into a new generation of larvae.

In the last five years our national loss because of moths has amounted to a **billion dollars,** and it is fast approaching a million dollars a day—not counting that swell dark-blue sweater of mine.—Henning Lawrence.

*N. Y. Herald Tribune.

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Local Organization News

New England Pest Control Association

The next regular meeting of the New England Pest Control Association will be held Monday, June 13th. Several interesting reports will be submitted including Classified Telephone Directory Listings, Constitution and By-Laws, etc. Bartlett W. Eldredge is president of the Association and will preside.

William O. Buettner, secretary of the National Pest Control Association is to be present at this meeting to lead a discussion in general matters of interest to the industry.

Connecticut

There may not be a definite local association in Connecticut but to all intents and purposes one might consider this an organized group in that the operators report splendid sessions under the guidance of Neely Turner, Connecticut Agricultural Experiment Station, New Haven, Conn.

Among the firms which have attended the meetings this spring were: Herbert R. Newton, Rexford's Lab, Hartford; W. F. Young, Kilsall Co., Bridgeport; W. R. Heap, Abbot Exterminating Co., Hamden; D. F. Mason, West Haven Ext. Co., West Haven; Fred Haas, Aetna Ext. Co., Hartford; Julius P. Tondat, Tondat Fum. Co., Hartford; O. N. Anderson, Berg Ext. Co., Hartford; John Duncan, Birchard System, New Haven; Harry B. Goss, Birchard System, Hartford; F. E. Bohman, Bohman Bros., Inc., Hartford; United Ext. Co., New Haven.

Associated Exterminators and Fumigators of New York

The regular monthly meeting of the Associated Exterminators and Fumigators of New York was held at 7 East 44th St., New York City. W. J. Parker, Executive Secretary, reviewed some of the high lights of the month's activities. President William O. Buettner, who presided, spoke of the plans for the Sixth Annual Convention of the National Pest Control Association to be held at Omaha, Neb. Walter S. McCloud, National Chairman of the Convention Committee, as guest speaker gave additional details about the coming convention. The Association voted to take a one-page advertisement in the Official Convention Program.

Looking ahead to 1939 and remembering that the World's Fair is to take place in New York City discussed the arrangements for the Seventh Annual Convention that it is expected will be held in New York City and thus give many an opportunity not only to visit the World's Fair but attend the convention as well.

The industry of New York City was invited to the meeting. Dr. Al Weed of John Powell & Co., spoke on Pyrethrum, Derris and Rotenone and led a discussion of the value of standarized insecticides. Dr. J. L. Horsfall, Entomologist, American Cyanamid and Chemical Corp., took as his subject "Moths."

Milwaukee Pest Control Association

At the annual meeting of the Milwaukee Pest Control Association election of officers for the ensuing year took place. Walter H. Last was elected president to succeed Harry J. Hammond, John Kourt was elected vice-president; Harvey Klein, secretary; and Henry Turrie and Adolph Tiedt, trustees.

Milwaukee is operating under the new fumigation ordinance and cooperating with the city officials in working out such details as fumigation notices, official warning signs, and precautionary notices. A demonstration is to be given as to what should be done in case of cyanide gas accidents. The local Health Department will provide a speaker at the next meeting. The Emergency Squad will conduct an artificial respiration demonstration.

Milwaukee is boosting 100% for the Sixth Annual Convention of the National Pest Control Association to be held at Omaha next October. The local association has subscribed to one half page advertisement in the official program.

California Pest Control Association, Inc.

The regular monthly news bulletin clearly showed the appreciation of all who had the

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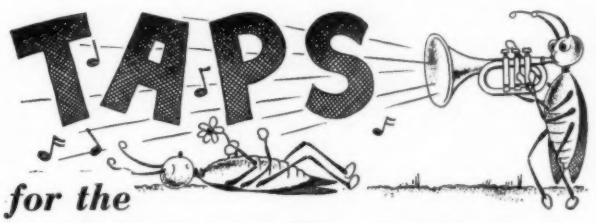

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Use 1¼-1½ lbs. for each 1000 cubic feet. Preferably tack burlap sacks around infested timbers. Spray part of the LARVACIDE directly against these sacks, as part of the fumigation job. If only a matter of infested chairs and furniture, treat in vault or other air-tight space.

MOTH MAY RETIRE into the depths of upholstered furniture — or the woolly snug refuge they expect blankets to afford.

But it Won't Avail Them For LARVACIDE penetrates every retreat and seals their doom. If you don't know about LARVACIDE'S advantages, write right now.

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privilege of attending the Palo Alto Conference. For the next few months until the Sixth Annual Convention of the National Pest Control Association which is to be held at Omaha, Neb., there wil be a series of active district meetings. Plans are being made for a large delegation to make the trip to Omaha.

The officers and chairmen of the various committees for the ensuing year are:

President: Lee W. Christensen, 3021 Fairmont Avenue, East San Diego.

First Vice-President: Wallace B. Tanner, Los Angeles.

Second Vice-President: Ernest G. Mills, San Francisco.

Secretary-Treasurer: Robert E. Hackley, 807 Waverley Street, Palo Alto.

Members of Executive Committee: Wilbur F. Smith, Pasadena: C. P. Cain, Frenso.

Director, District No. 1: L. W. Christensen, East San Diego.

Director, District No. 2: W. B. Tanner, Los Angeles.

Director, District No. 3: C. W. Mollard, Santa Barbara.

Director, District No. 4: C. P. Cain, Fresno.

Director, District No. 5: O. E. Wheeler, Stockton.

Director, District No. 6: W. K. Davis, Berkeley.

Director, District No. 7: E. G. Mills, San Francisco.

COMMITTEE CHAIRMEN

1939 Convention: Wayne K. Davis, Berkeley. 1939 Conference, Publicity and Bulletin: George A. Rader, Berkeley. Legislation: Elmer A. Roberts, Burlingame. Membership: William Hogan, Pasadena; E. G. Mills, San Francisco. Ways and Means, Educational Display: L. R. Alderman, Los Angeles. Standards: W. J. Burgin, Long Beach. Rules and By-Laws: A. T. Parsons, San Mateo. Advertising: O. W. Dickens, Los Angeles. Insurance: W. B. Tanner, Los Angeles. Ethics: J. K. Hougham, Visalia.

California—District No. 7—San Francisco Area

This district held their May meeting at the Mark Twain Hotel in San Francisco, and seventeen members attended. It was decided to follow the plan of District No. 2, wherein copies of the minutes of each meeting will be mailed to all other districts in order to bring about united interests in all association activities.

Copies of the State Association's new Constitution and By-Laws were distributed to each member present. District No. 7 voted to abolish its local Constitution and By-Laws, and in the future to abide wholly by those adopted by the State Association at the last convention.

Our state secretary, Bob Hackley, read a letter from Dr. J. C. Geiger, Director of Public Health in San Francisco, wherein the Health Department requests the cooperation of all commercial pest control operators in reporting the number of rats and mice killed in San Francisco each month; also location of each kill. Mr. Montgomery reported having made such a request for the month of April. His reaction was that such reports will not reflect detrimentally to the industry, but on the contrary Monty believes that such cooperation will react favorably for the commercial operators by putting the industry in a position to ask health authorities to keep city and federal rat-catchers out of high-rent districts. Ernie Mills expressed himself as being very definitely against submitting reports of this nature. His contention is that the reports are of very questionable value in presenting a true picture of actual conditions, due primarily to the use of chemicals by many operators. When chemicals are used it is utterly impossible to determine with any degree of accuracy as to how many rats or mice have been killed. Ernie pointed out that whether large or small kills are made, the figures could be juggled to arrive at most any conclusion. It was decided to have Bob Hackley answer Dr. Geiger's letter and ask for suggestions as to how such a report could be made by operators using chemicals, also asking for a time and place for meeting with members of the health department.

Mr. A. T. Parsons gave a progress report on his activities having to do with educating the Banks and Loan companies to take full and complete advantage of requiring termite inspcetions by Licensed Pest Control Operators. After much discussion it was decided to meet at George Rader's place in Berkeley on the night of May 24, 1938, at which time it is planned to bring out some plans of a concrete nature. This will be a meeting for all operators in Northern California interested in termite control.

Ernest G. Mills, President, presided. Among those present were J. E. Beochler, Geo. W. Peterson, H. J. Davies, S. L. Strang, H. B. Noble, August Muenter, Robert E. Hackley, A. T. Parsons, E. G. Mills, Wayne K. Davis, V. H. Montgomery, Ormand H. Nelson.

Specialists in

Highest Quality Tested Pyrethrum and Rotenone Products

John Powell & Co., Inc.
114 East 32nd Street
New York, N. Y.

ODOR!

Solve your *odor* problems and you will help to solve your *order* problems. Today, bad odor is "on the spot." The demand is for better smelling products.

Givaudan-Delawanna has been producing odors for fly sprays, insecticides and disinfectants from the very first. We have grown up with the trend, and have developed specific odors for specifc products.

If you want to give your product the added sales factor of a pleasant odor, just send in your problem to us and let our laboratories demonstrate how efficiently and inexpensively we can meet your special requirements.

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DELAWANNA, INC.
Department A, 80 Fifth Avenue, New York

When Writing Advertisers Mention the Log

California Pest Control Association, Inc.

Division No. 2, Los Angeles

The regular Monthly Meeting of the Los Angeles Division of the State Association was held, Thursday night, May 5, 1938, at Haskell's Cafe. There were present thirty-two members, who heard a splendid talk by Mr. G. D. Bender of the State Department of Agriculture, Division of Chemistry, on the State Economic Poison Act and its application to pest control business. After a thorough discussion of our problems, a committee was appointed to collect all the data possible to obtain a picture of the general conditions that now exist regarding the actual practice of this act and report their findings at the next meeting.

Mr. Wilford Gunn of the Hollywood Termite Control Co., discussed the proposed changes in the Los Angeles City Termite Ordinance and asked for the support of the new ordinance. Committee was appointed to make an investigation and report to the division at the next regular meeting.

Mr. W. B. Tanner invited all firms of the Association to join the Bowling Contest that is now being sponsored by the California Termite Control Company, and the Western Exterminators, Inc. Several firms are considering the signing up of teams chosen from among their employees. Prizes are being offered to the winning team at the close of the contest. Ladies were invited to attend and watch the "Fight," and do their usual stuff.

We regret to report the death of Samuel Pencille of the Guarantee Fumigating Company of Los Angeles, and extend our deep sympathy to the parents, Mr. & Mrs. J. W. Pencille.

A deep sea fishing trip is now being planned for the middle of June by O. W. Dickens, and is open to all members of the industry. See Dick for details and arrangements.

National Association Notices

Members are urged to call on each other, especially when traveling about the country. A permanent office is not required, but for those firms visiting New York City, it is urged that the secretary be called at either South 8-4116 or South 8-4120 and appointment will be arranged.

Communication #119:—Membership Service letter sent April 9th discussing in particular the subject of Termites and Classified Telephone Directory Listings. Two pages of this letter took up the subject of Insurance.

Communication #120:—Membership Service letter covering several items of helpful information. A supplementary membership list including corrections was included. This was sent to the membership on May 3rd.

Communication #121:—Membership service letter sent May 28th with emphasis on Fumigation Helps and other items of interest to assist the members.

Communication #122:—A membership service letter that will be sent toward the middle of June and give some advance information about the convention to be held in Omaha, Neb., October 24-25-26.

Communication 5-F:—Usual business of the Association for attention of the Board of Directors with emphasis on membership and the convention.

Communication 5-G:—Usual business of the Association on the subject of the Convention. Sent May 12th.

Communication 5-H:—Usual business of the Association for attention of the Board of Directors sent May 25th. A continued discussion of the convention program.

Membership: Many firms continue to make inquiry about joining the Association. The secretary will forward application for membership form to those who make request. Any firm desirous of giving co-operation in terms of making for a better industry and can meet the requirements of Association membership will be welcome. The dues are $10.00 per year with no pro rata amount for a portion of the year. The fiscal year runs from January 1st to December 31st.

National Seal: It is gratifying to notice the general use of the seal on letterheads, advertising and classified telephone directory advertising. If you have not ordered your cut, do so immediately. Cuts are provided in two sizes, ½x¾" and ¾"x1". The charge is $1.00 per cut or if two or more are ordered at the same time, $1.00 for the first cut and 50c additional for the extra cuts. No orders filled without check or money order accompanying.

Do a good, clean job with

ANT-X

"Their Last Meal"

For Indoor Service

Ant-X DEATH BOX

The Thallium treated double bait attracts and destroys both the sweet and grease eating type Ants. Locked cover assures utmost safety in the home. Cannot be opened by a child or spilled by a dog, cat or other domestic animal. Inexpensive and simple to use. One size only. Send for sample box, 25c postpaid.

For Outdoor Service

Ant-X DEATH TUBE

Sweet type "Jelly Bait," Thallium treated in handy collapsible tubes for use especially on golf courses, lawns, greenhouses, etc. A DROP ON THE SURFACE KILLS ANTS IN THE NEST. Also brings certain death to rats, mice, roaches, flies, etc. In 1 and 5-ounce tubes. Send for sample, 25c postpaid. Also 5-lb. pails.

Other **NOTT** Successes

RAT-NOTS	Prepared non-poisonous bait.
MOUSE-NOTS	Prepared Strychnine treated bait.
MOLE-NOTS	Prepared Strychnine treated bait.
ROACH-NOTS	Prepared Fluoride treated bait.
DOGSKOOT	Dog repellent.

For retail sales, these nationally advertised "Nott Products" are available in sizes suitable for over the counter sales, attractively packaged in striking multi-colored counter display cartons.

Consult us when next in the market for Canary Seed, Hemp Seed, Red Wheat—Strychnine or Thallium treated.

QUOTATIONS ON REQUEST

NOTT MANUFACTURING CO.

General Offices, 275 Water St., New York City

Chicago, Illinois Portchester, N. Y.

Why Waste Time Treating the Wood. Destroy the Termites at Their Source in the Soil.

GROUND TREATMENT METHOD OF TERMITE CONTROL

EXTRA PROFITS *For Exterminating Companies*

Authorities agree Termites must have soil contact for moisture. Our new Ground Treatment Method for Control of Subterranean Termites offers Exterminating Companies a most welcome additional source of profits. These profits can be obtained with little extra effort. Both termites and other pests can be located at the same time.

EXCLUSIVE TERRITORY RIGHTS

New aggressive advertising campaign brings immediate profits to first applicants. Tremendous opportunity for year 'round profits are reflected by inspection records that show one out of each three homes infested with termites. Process simple to apply. Does not damage trees or shrubs.

WRITE FOR FREE BOOK

Send for your copy of the "ABC of This Termite Business." Learn more about our simple method of termite control. Complete information will be sent without any obligation on your part.

Extermital Chemical Co.

11 St. Marys St. Dept. 46 Dayton, Ohio

What's New In Pest Control—Personals

Bob Loible insists that Bill Hoan has all the luck in poker.

Professor Davis reports everything bigger and better in California, including tornadoes, Pullman tickets, and floods.

Professor Davis states that the P. C. O.'s of California are the "ultra-personified" when it comes to hospitality.

The Franklin Extermination Systems of Columbus, Ohio, announces its removal to newer and larger quarters, the new location being 640 E. Main St.

They also announce the opening of a new branch office at 211 S. Union St., Lima, Ohio. It is interesting to note this evidence of good business.

It may be five months off before the Sixth Annual Convention of the National Pest Control Association to be held at Hotel Fontenelle, Omaha, Nebraska, but there seems plenty enthusiasm. Many have signified their intention of attending and have even submitted questions they would like to see discussed. Walter S. McCloud, General Chairman, 510 No. Dearborn St., Chicago, Ill., will be pleased to hear from any who would like to make suggestions. Booth Exhibit Space seems to be at a premium.

The March issue of "House and Garden," Section Two, published an article on "Termite Control." In the May issue of "Better Homes and Gardens" there is also an article captioned "Telling Facts About Termites." Some splendid points are made but there are also errors in thought with regard to control methods. Articles of this type would be much more satisfactory from the standpoint of P.C.O.'s if they were written by those who understand termite **control** as well as some of the "Facts" about Termites.

Newspapers, magazines, radio and stage are giving much attention to pests. Clyde Lewis in his cartoon "Hold Everything" shows father and son in bed and the father upbraiding his son as the following answer is given to an obvious question about possible noises the boy was hearing: "All right, all right. You heard a mouse squeak —what am I supposed to do, oil it?" Our answer is to call a P. C. O.

It is said that the use of Karaya gum as an agent to increase toxicity of red spider sprays has been found highly efficient.

The Sixteenth Annual Convention of the Sanitary Supply Field held at Roosevelt Hotel, Pittsburg, Pa., May 16-18 was well attended.

A new book on Wood Preservation has been brought to our attention. This book is the first comprehensive treatise on the subject in many years. It is of value to all those interested in the use of treated wood and the nature and efficiency of various methods and preservatives.

The authors are George M. Hunt, in Charge, Section of Wood Preservation, U. S. Forest Products Laboratory, and George A. Garratt is Associate Professor of Forest Products, Yale School of Forestry.

The book has 457 pages, contains 108 illustrations, and costs $5.00. It may be purchased from McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y.

Mr. C. H. W. Hasselriis, president of the Ratin Laboratory, Inc., of New York City, and a practising exterminator, on May 2, addressed the New York University School of Education, on education in Denmark. His lecture "Denmark, Land of Balance" dealt principally with education in terms of living, the Folk High Schools, Agricultural Schools, Cooperatives, and the Social Legislation of Denmark.

Fuld Brothers, Baltimore, manufacturers of sanitary chemical supplies, have recently announced the appointment of the Eastern States Supply Company, Brooklyn, New York, as sales representative.

J. Frank Toole and Martin I. McGowan, of the Eastern States Supply Company, are well known in the sanitary supply trade throughout greater New York and plan an intensive selling campaign for the newly acquired line.

The Fuld Brothers also maintain sales offices in Seattle, Washington, Kansas City, Missouri, and Boston, Massachusetts.

Charles W. Houghton, secretary of the New England Pest Control Association, on his recent visit to New York spoke en-

"POSITIVE" - "SAFE" and "SURE"
USICO SILVERFISH CONCENTRATE

"FACTS"

KNOWN WORLD WIDE!

(1) It will exterminate all Silverfish in building completely and properly treated within 40 days; ONE TREATMENT will protect against reinfestation for THREE YEARS.

(2) Harmless to human beings and animals, simple to apply, no tearing up or marring woodwork, yet placed away from any chance of removal. No inconvenience to tenants whatever.

(3) One pound will treat completely — three 2-room apartments, two 3-room apartments, or a basement room 20x20.

(4) It has fulfilled every claim made for it, under the worst conditions known. Write for testimonials.

(5) "NEW LOW PRICES" — $1.00 per pound, f.o.b. Seattle, Washington. Minimum amount 10 pounds. Shipped express, second class.

(6) *Don't envy the exterminator who can guarantee the above performance, be one!!!*

U. S. INSECTICIDES CO.

412 Hoge Building Seattle, Washington

Kills All Mice

Calico Seed is a ready-to-use preparation that lures and quickly kills mice. Absolute Money-back Guarantee. No objectionable odors. Used in foreign countries and coast to coast by the largest Public Warehousemen, Seedmen and Public Exterminators. Highly recommended.

Industrial Size: 8-ounce pour spout can. 10 Pounds, $4.00; 25 Pounds, $7.00; 50 Pounds, $12.00; 100 Pounds, $22.00. All Delivered.

SATISFACTION GUARANTEED OR MONEY REFUNDED

The Bagnall Company

STATION A KANSAS CITY, MO.

thusiastically about the progressive program being conducted by the local association in Boston. Emphasis is on the Classified Telephone directory listings. Incidentally Charlie included Montreal, Canada and Washington, D. C., on his recent travels.

Akron, Ohio is reported as considering legislation in connection with fumigation operations. It would appear that it is an old story of proper precautions before, during and after fumigations not being given as much attention as should be given.

The Connecticut pest control operators enjoyed the conferences held with Neely Turner of the New Haven Agricultural Experiment Station and expressed their appreciation by presenting Mr. Turner with a pen and pencil set. Conferences will be resumed in the fall.

Question: What is the largest rodent?
Answer: The Capybara rat is the largest of living rodents, reaching a length of four feet and a weight of 75 pounds. It has webbed feet and a coat of reddish-brown fur.

The Spring Meeting of the Indiana Academy of Science was held May 13-14 at McCormick's Creek State Park. Prof. J. J. Davis will be in charge of the Annual Meeting to be held early in November.

Thursday, May 19th, was a day of much happiness in the Roberts' family of Burlingame, California. The double wedding attracted many friends to the International House at Berkeley, Calif., as Miss Dorothy Roberts was married to Charles M. Miller, and Miss Mildred Frances Stockton was married to Donald G. Roberts. Mr. & Mrs. Elmer A. Roberts of Burlingame, Calif., need no introduction to many in the industry. Congratulations all round.

The May 1938 issue of the American Journal of Public Health published the paper written by Dr. John Oberwager, Director, Sanitary Bureau, Department of Health, New York City entitled "Supervision of Fumigation and Extermination."

The sympathy of the industry is extended to Bill Stover of Detroit, Mich., whose brother, Ray, died the early part of May. Many will remember Ray Stover when the Annual Convention of the National Pest Control Association was held in Detroit, Mich.

Walter S. McCloud made a trip to New York and other cities along the Atlantic seaboard in the interests of the coming Annual Convention of the National Pest Control Association which is to be held in Omaha, Neb., October 24-25-26. All indications are that it will be a splendid convention. No details are being overlooked in planning for a well balanced program of outstanding speakers and clinics.

The National Better Business Bureau has issued a revised bulletin on Termites. The second edition is an improvement but there remains other changes that should be made.

Somewhat late in our congratulations but there are those quiet men in the industry who require the sleuthing reporters to gather news which in this case is the happy marriage that took place last Christmas Day of Miss Grace Picchione and Joseph Pero. Mr. Pero is the owner of the American Exterminating Co. of New York City. Someone page Bill Buettner so he might kiss another bride.

While we cannot conceive that any termite control operator would take seriously Jack Benny's statement over the radio on his famous Jello program that termites were actually ahead of him in that they went down the street to meet the lumber trucks, nevertheless there was an advertisement that tried to tell the public that termites were being carried in on lumber. The vigorous protests of several organizations are reflecting the purpose of putting an end to abusive advertising.

A recent news release from one of the leading universities carries the caption "Beware of Swindling Pest Control People." This news release states that there are many reliable and experienced termite control operators who are rendering a highly valuable service but at the same time found it necessary to release the article in view of the fact that complaints had been coming from many home owners that an unscrupulous type of termite control operator was unduly creating a fear that termites are destroying houses in a short time. In addition to this, these unscrupulous operators were collecting money for questionable services.

With regret we hear of the death of David T. Lauderback. For many years he conducted the Monroe Laboratories and Exterminator Company at Chicago. Ill. Our sympathies are extended to Mrs. Lauderback and family.

EXTERMINATORS CHEMICALS

DeHaen's Imported
or Domestic
SODIUM FLUORIDE 95/97%
White or Tinted

RUMETAN ZINC PHOSPHIDE
For Rats, Mice and Mole Crickets

THALLIUM SULPHATE
For Rodent and Ant Extermination

DEODO
Special Odor for Kerosene Spray

NO-DOR
A Chemical Odor Killer

FORMULA HINTS SENT ON REQUEST

Pfaltz & Bauer, Inc.
EMPIRE STATE BLDG., NEW YORK

COLOR AND PERFUME
DEODORANT
BLOCKS AND CRYSTALS
WITH
COLOROMES

Economical and simple to use, COLOROMES impart lasting fragrance and color to Paradichlorbenzene and Naphthalene products of all kinds. Available in a complete assortment of popular perfumes combined with related color. (Also perfumes without color.)

SEND FOR SAMPLES AT ONCE

FELTON Quality
FELTON CHEMICAL COMPANY, INC.
603 Johnson Ave., Bklyn, N.Y.

Manufacturers of Aromatic Chemicals, Natural Derivatives, Fruit Ethers, Terpeneless Essential Oils, Vanilla Concentrates, Natural and Imitation Flavor Bases.
STOCKS CARRIED IN PRINCIPAL CITIES

Write for These Booklets

The latest helpful informative service literature will be sent to you without cost or obligation.

Please note, however, that you must request each booklet on a separate letterhead, though they may all be mailed in the one envelope to 514 East 14th St., Kansas City, Mo.

FUMIGATION POINTERS

Service bulletin showing varied applications of the Cyanide Generator and its easy adaptability. Also discusses Fumigation Furniture En Route as a profitable field opening up for the fumigator; atmospheric and vacuum vault fumigation; mushroom house fumigation and illustrated data on a new lock seal which promotes safety.

FREE TO INTERESTED FUMIGATORS. WRITE DU PONT c/o THE LOG

AGRICULTURAL PRODUCTS

Attractively illustrated folder discussing chemistry in agriculture; jelly ant bait and directions for use on golf greens; gardens and shrubs; household. Mention is also made of an organic turf fungicide and directions for its use. Borerkil for tree boring insects; effective method of borer control and directions for use. Borerkil force gun illustrated. Use as a dog repellent; fumigant for poultry roosts. Formula for nicotine spray also given.

FREE TO INTERESTED PEST CONTROL OPERATORS TREE SURGEONS. WRITE LETHELIN c/o THE LOG

NEW BULB FOR PEST CONTROL OPERATORS

If you've ever been confronted with the problem of obtaining a properly balanced bulb with a natural easy grip to eliminate palm cramp the manufacturers of the Centrobulb claim they have embodied this feature in their new bulb. In addition they claim it is guaranteed seamproof with a nozzle made of heavy rustless metal which they guarantee not to crack even under pounding. It has a deep cut thread and won't work loose with a larger opening for instant filling with a metal screen to prevent clogging. The nozzle base is permanently attached to bulb.

IF YOU'D LIKE FURTHER PARTICULARS ABOUT IT PLEASE WRITE CENTRAL c/o The Log.

PARADE OF SANITARY CHEMICALS AND ACCESSORIES

Worth while catalog which gives detailed information certain chemicals; deodorants; disinfectants; essential oils; insect dusters; liquid insecticides; insect powders; liquid soap; mice seeds; moth preventatives; polishes; rat poisons; rubber blowers; special cleaners; sprayers, etc.

FREE COPY AVAILABLE TO PEST CONTROL OPERATORS. WRITE ELKAY, c/o THE LOG

SPRAYERS

Illustrated and colored folder on line of hand sprayers in colored floral designs which lend themselves to ready sales. Guaranteed to do good work and give good service.

YOU MAY OBTAIN YOUR FREE COPY OF THIS FOLDER BY WRITING CHAPIN c/o The Log.

MILL FUMIGATION

Folder describing an effective mill fumigation; practical directions; elevators; purifier conveyors; long conveyors; rolls and reels; spouts; empty sacks; flour bins; corn meal mills. Also contains information on preparation for insect control in plant floors, walls, etc. for weevils, moths, beetles and many other similar insects. Further data on Grainfume for treating stored grain.

SHOULD PROVE OF INTEREST TO ALL PEST CONTROL OPERATORS INTERESTED IN MILL FUMIGATION. FREE COPY BY WRITING SELIG, c/o The Log.

RATS SPREAD DISEASE

Interestingly gotten up leaflet on why it costs more to keep rats and mice than it does to kill them. Product it is claimed kills

Monarch Powder Sprays

Used by Many Leading Exterminating Concerns Throughout the Country

Made in 3 Sizes

No. 40 Has 14 Ounce Capacity

No. 41 Has 9 Ounce Capacity

No. 42 Has 8 Ounce Capacity

Large Opening in Neck Affords Easy Filling

Screens Powder Perfectly

Made of High Grade Materials

Write for Catalog and Price List

THE VANT WOUD RUBBER CO.
JERSEY CITY, - - - - NEW JERSEY

WEAR APPROVED

PROTECTION AGAINST HYDROCYANIC ACID GAS . . .

You can rely upon the safety and unusual wearing comfort built into this mask . . . officially approved for protection against Hydrocyanic Acid Gas by the U. S. Bureau of Mines. It is equipped with the famous Kops-type facepiece that fits any face perfectly, adjusts easily and permits normal hearing, sight, speech and working freedom.

● Write for a demonstration (there's no obligation) or for information on a suitable M.S.A. Mask for any other gaseous hazards.

MINE SAFETY APPLIANCES CO.
Braddock, Thomas and Meade Streets, Pittsburgh, Pa.
District Representatives in Principal Cities

M·S·A HYDROCYANIC ACID GAS MASK
DEMONSTRATIONS BY REQUEST

rats without poison. For use in the homes, stores, factory, hatchery, warehouse or other buildings.

FREE COPY MAY BE HAD FOR THE WRITING BY PEST CONTROL OPERATORS. JUST WRITE RAY LUNCHES, c/o The Log.

THE TERMITES' LAST MILE

Is the unusual title for an interesting 36 page illustrated booklet on the all important subject of termites. It discusses among other things Labor and Expense; Metal Shields; Chemicals vs. Shields; Research; Sound Practice; Inspection, etc.

YOUR FREE COPY IS AVAILABLE. JUST WRITE GOULARD c/o The Log

PYROCIDE 20 DEODORIZED CLARIFIED

Is the subject of an informative and instructive pamphlet. Illustrated. Lists some pertinent facts about Pyrethrum; chemical evaluation of pyrethrum; biological evaluation of Pyrethrum; commercial grades of Pyrethrum; effect of storage, light, and heat on Pyrethrum products. Formulae for household insecticides, livestock sprays, mosquito larvicides; horticultural sprays.

FREE COPY OF PAMPHLET MAILED FREE TO INTERESTED PEST CONTROL OPERATORS and INSECTICIDE MANUFACTURERS. Write McLaughlin, c/o The Log.

THE A B C OF THIS TERMITE BUSINESS

Is the title of this worth-while booklet covering such subjects as what are termites, what do termites eat, where do termites live, how do termites form new colonies, when termites swarm, how many colonis are established; does the parent colony die when the swarmers leave, do termites work in all kinds of wood, how do termites damage a building, how can termites be detected, how can termite damage be told from "dry rot," how do termites enter a building, why is termite damage increasing, does spraying timbers in a building with creosote stop termite attack, can timber be treated after the building has been completed, is a partial or localized treatment effective, are termites dangerous to humans; map showing wherein termites are found, etc. Illustrated.

FREE COPY TO INTERESTED TERMITE CONTROL OPERATORS. WRITE EXTERMITAL, c/o The Log.

MOTH PROOFING

Interesting leaflet describing 100% moth proofing which is odorless, colorless, nonpoisonous. Gives chemical constituents and process for applying.

FREE COPY TO MOTH PROOFERS. WRITE KATATEX, c/o The Log.

HOUCHIN CATALOG

Contains data on Blower for powders and liquids; also information concerning Insect Powder Bellows. Should be of interest to all pest control operators.

WRITE FOR YOUR COPY BY ADDRESSING HOUCHIN, % The Log.

SANITARY CHEMICALS

50-page catalog of interest to recognized dealers and jobbers who are interested in the subject of private label merchandising, for such products as deodorant blocks, insecticides, such as fly sprays, bed bug and roach sprays, cattle sprays, mill and warehouse sprays, vaporizer sprays, moth sprays, roach powders, ant insecticides, rat poisons, agricultural sprays, mosquito larvicide. liquid deodorants such as chlorozif, formaldehyde sprays, pine deodorants, drip machine fluids, kilan-odor, theatre sprays, etc.

FREE COPY TO INTERESTED DEALERS AND JOBBERS. WRITE FULD, c/o The Log.

SAFETY EQUIPMENT FOR P. C. O.

Free literature on all types of safety equipment, such as gas masks for fumes, respirators for dust, approved by the Bureau of Mines, hard rubber drainers, aprons and goggles, and various other types of safety equipment for protecting Pest Control Operators on all hazards.

FOR FURTHER INFORMATION WRITE WAHLERT, c/o The Log.

SOLVAY PRODUCTS

48-page booklet in colors and illustrated, covering their entire line of Alkalies and Special Products, with a special section dealing with Para-Dichlorobenzene and Ortho-Dichlorobenzene.

FREE COPY MAY BE HAD BY PEST CONTROL OPERATORS. WRITE SOLVAY, % The Log.

"Cheap things are not good, good things are not cheap."

"He denies himself who asks what it is impossible to grant."

McCORMICK'S

PYRETHRUM POWDER

DERRIS POWDER - CUBE POWDER

Finest ground powders of their kind in the world. Contain more killing particles per ounce. More effective and economical because they come into more intimate contact with vital parts of the insect's body.

Standardized analytically and biologically in the McCormick Laboratories — most complete laboratories in the insecticide industry. Our recommendations for the use of these powders are based upon actual field performances.

For Further Information, Write

THE McCORMICK SALES CO.

BALTIMORE, MARYLAND

J-O PASTE

To the vermin exterminator who is desirous of extending an outstanding service to his client J-O PHOSPHOROUS PASTE *is* the solution

For the control of rats and roaches this product is widely and successfully used by Pest Control Operators throughout the country.

J-O ROACH TRAP

For use with J-O Paste

Convenient & Safe

TRIAL OFFER

Send $1.00 and we will ship to you postpaid a two-pound can of J-O Paste, with twenty-four J-O Roach traps, as illustrated.

Prices on 25 and 45 Lb. Pails on request

JOHN OPITZ, INC.

50-14 39th Street Long Island City, N. Y.

Manufacturers of Exterminating Products Since 1874

800-Mile-an-Hour Insect Debunked by Science

THAT 800-mile-an-hour insect, the deer botfly, has been completely debunked by science. Twenty-five miles an hour would be more like a reasonable speed for the creature, declares Nobelist Irving Langmuir, associate director of the General Electric research laboratories. (Science, Mar. 11.)

Dr. Langmuir went at the problem of the fly's alleged high velocity—almost twice the speed of the fastest airplane—in a number of ways. Both by theoretical calculations and laboratory experiments he proved that it just can't happen.

The fly's speed has been given as 818 miles an hour in widely circulated reports. To do that, Dr. Langmuir calculated, it would have to develop five-tenths of a horsepower—rather formidable job for an insect. In doing so, it would have to consume about one and one-half times its own weight in food every second it is in flight—and it carries no lunchbox.

But supposing it could develop such power and attain that speed. Against its practically flat head there would develop a pressure of about eight pounds per square inch, probably enough to crush it. If it struck human flesh at the velocity of 818 miles an hour (400 yards per second) it would exert a force of 310 pounds, or about four tons per square inch. That is, it would be a fairly efficient bullet, and would cause a serious wound; nothing of the kind has ever been reported.

In his laboratory experiments, Dr. Langmuir suspended a lump of solder of approximately the dimensions of the fly on a silk thread and swung it at various velocities in a brightly-lighted, white-ceilinged room.

At 13 miles an hour it could be seen only as a blur; at 26 miles it was barely visible; at 43 miles it appeared only as a faint line and its direction could not be told; at 64 miles an hour it became completely invisible. Laboratory light intensity measurements bore out the experimental results: At 64 or more miles an hour an object the size of the deer botfly becomes invisible.

Dr. Langmuir concludes with the estimate that a speed of 25 miles an hour is a reasonable one for the insect, while 800 miles an hour is "utterly impossible."

—Science News Letter.

Omaha Police Balk

Declare Catching Insects Not Part of Their Duty

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"Catch that spider," she demanded, pointing.

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Additional Patents Relating to Pest Control

By DR. R. C. ROARK

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2,106,978 (Feb. 1, 1938; appl. Apr. 12, 1934; in India, April 27, 1933). WOOD PRESERVATIVE COMPOSITION. Sonti Kamesam, New Forest, Dehra Dun, British India.—A wood preservative consists of about 3 parts by weight of a copper sulphate, about 1 part by weight of a water-soluble arsenate, and about 3-5 parts by weight of an alkali dichromate.

2,106,983 (Feb. 1, 1938; appl. Feb. 27, 1937). WOOD PRESERVATIVE. Kenneth H. Klipstein, Short Hills, N. J.—Calco Chemical Co., Inc., Bound Brook, N. J.—An insecticidal composition comprises a volatile petroleum solvent, bentanaphthol and diacetone alcohol.

2,107,080 (Feb. 1, 1938; appl. June 4, 1935). ANIMAL TRAP. James MacDonald Mitchell, Ole Lyme, Conn.

2,107,298 (Feb. 8, 1938; appl. March 27, 1934). INSECTICIDE. Lowell B. Kilgore, Washington, D. C.—Kilgore Development Corp., East Falls Church, Va.—An insecticide comprises an organic compound having as part of its molecular structure a methylene radical interposed between two keto carbonyl radicals forming a group which is subjected to an electronic strain causing the methylene hydrogen atoms to become labile and migratory. Compounds toxic toward insects are: Acetyl acetone, dibenzoyl methane, benzoyl acetone, ethyl acetyl pyruvate, and ethyl benzoyl pyruvate.

2,107,726 (Feb. 8, 1938; appl. Oct. 2, 1935). SPRAY GUN. Svend Bramsen and Fritz Wahlin, Chicago, Ill.—Binks Manufacturing Co., Chicago, Ill.

2,107,732 (Feb. 8, 1938; appl. July 31, 1935). SPRAY GUN WITH PNEUMATIC MATERIAL CONTROL. Eric Gustafsson

(Continued on page 26)

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and Fritz Wahlin, Chicago, Ill.—Binks Mfg. Co., Chicago, Ill.

2,108,599 (Feb. 15, 1938; appl. Apr. 11, 1934). GRASSHOPPER TRAP. Halvor Olsen Eiane, Washington Island, Wis.—This invention relates to improvements in grasshopper traps, in which transparent baffle plates vertically disposed at the mouth of the traps in conjunction with diagnally disposed wire-screen leads play the chief role.

2,109,143 (Feb. 22, 1938; appl. March 20, 1934; in Germany, March 22, 1933). DRY DISINFECTANT FOR SEEDS. Fritz Wolff, Berlin, Germany—Schering-Kahlbaum A. G., Berlin, Germany.—A non-dusting, dry disinfectant for seeds of good adhering qualities comprises fatty water-insoluble substances having an absorptive capacity for water taken from the class consisting of lecithin, isocholesterin, wool fat and its components, and fungicidal organic mercury compounds, said disinfectant being substantially free from water-repellent fatty and waxy substances.

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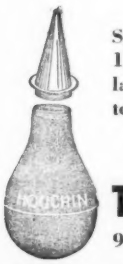

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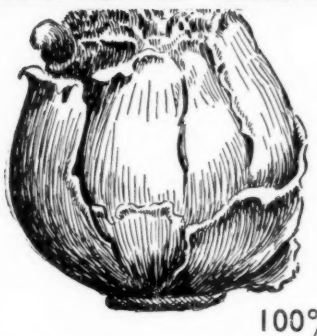

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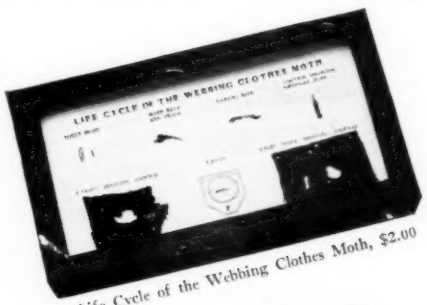

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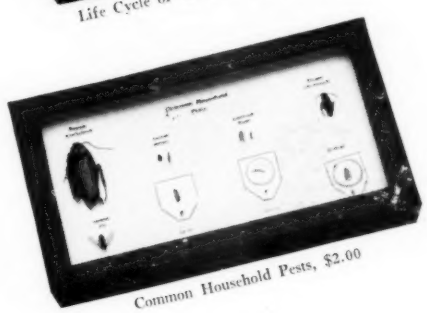

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